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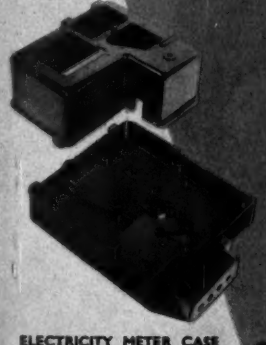
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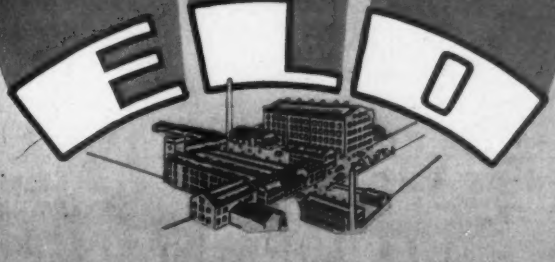

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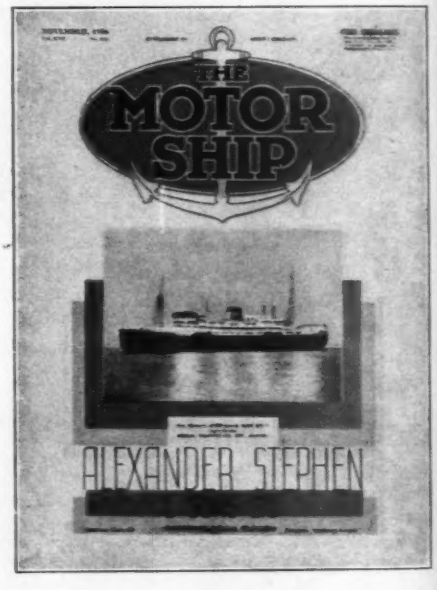

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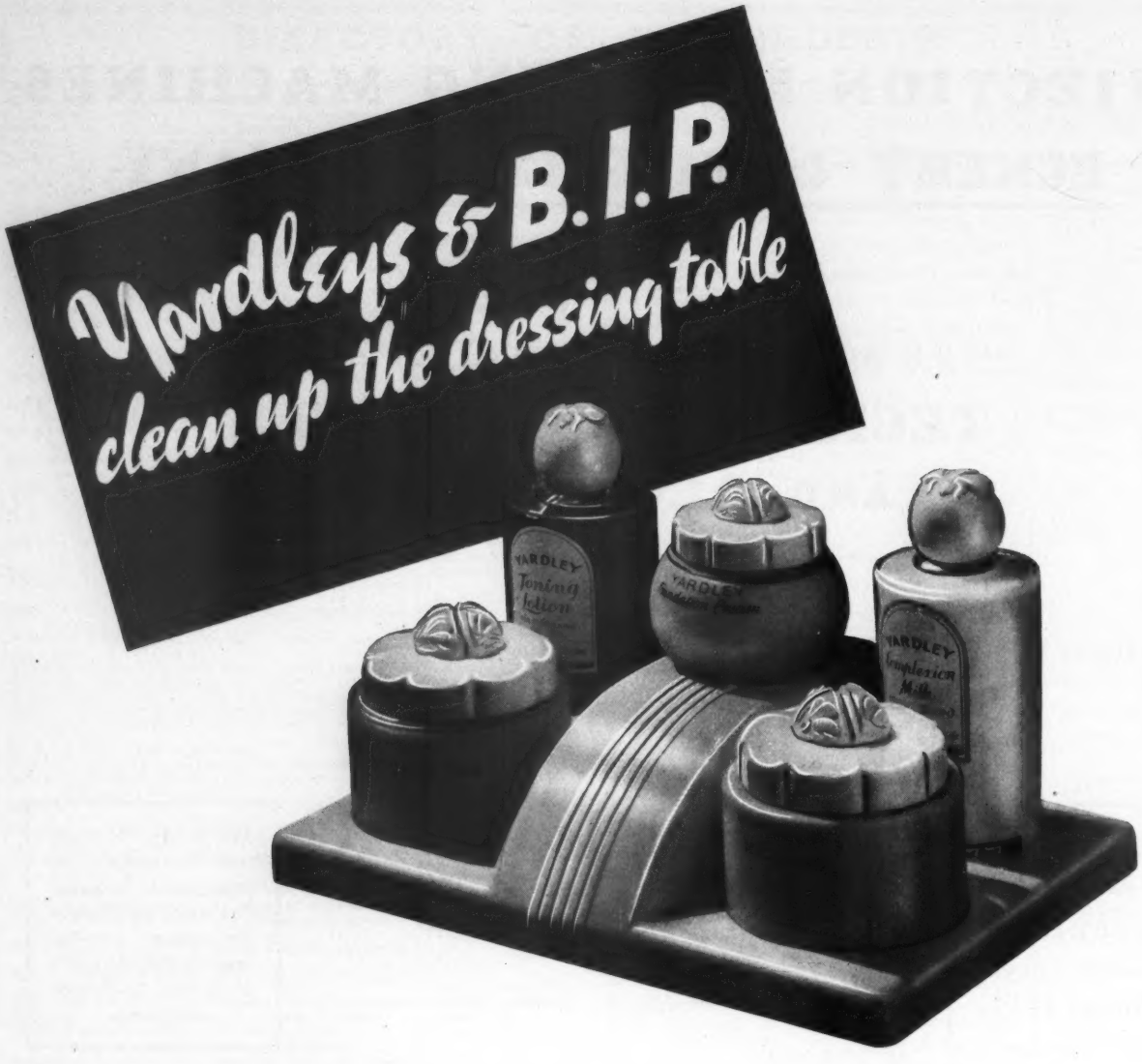

Yardley wanted a new presentation for their well known beauty aids—a presentation that would look well on the counter *and* on the dressing table. Obviously another job for plastics, so Yardley consulted B.I.P. The result—the Yardley Beauty Dresser—is pictured here. The stand was designed by B.I.P. and moulded in Beetle Ivory by Streetly Manufacturing Co., Ltd., the moulding division of B.I.P. The closures for the bottles and jars are also moulded in Beetle.

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B I P

Plastics

Dealing with the Manufacture, Uses and Potentialities of Plastic Materials.

Vol. III. FEBRUARY, 1939 No. 21

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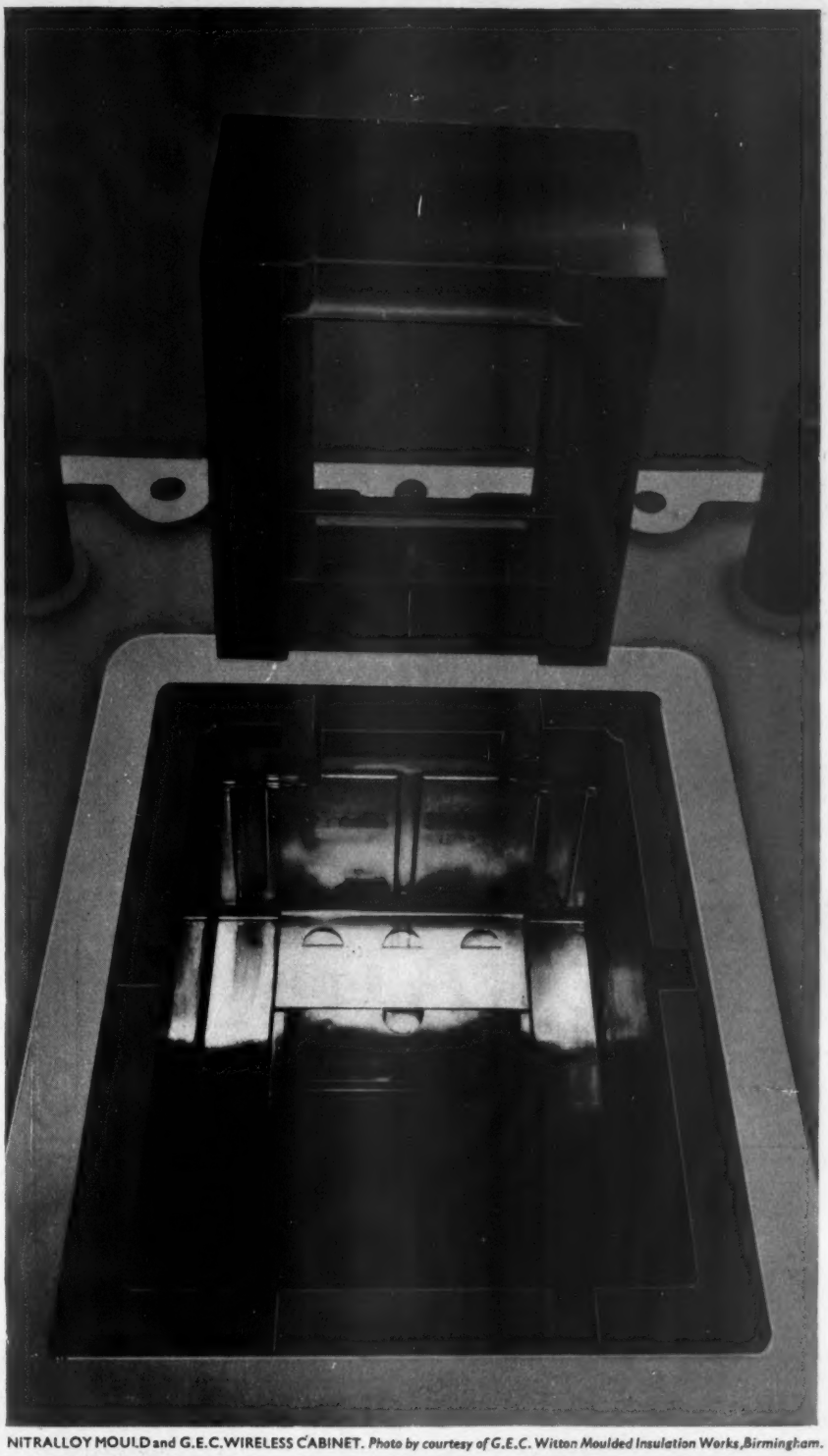

NITRALLOY MOULD and G.E.C. WIRELESS CABINET. *Photo by courtesy of G.E.C. Witton Moulded Insulation Works, Birmingham.*

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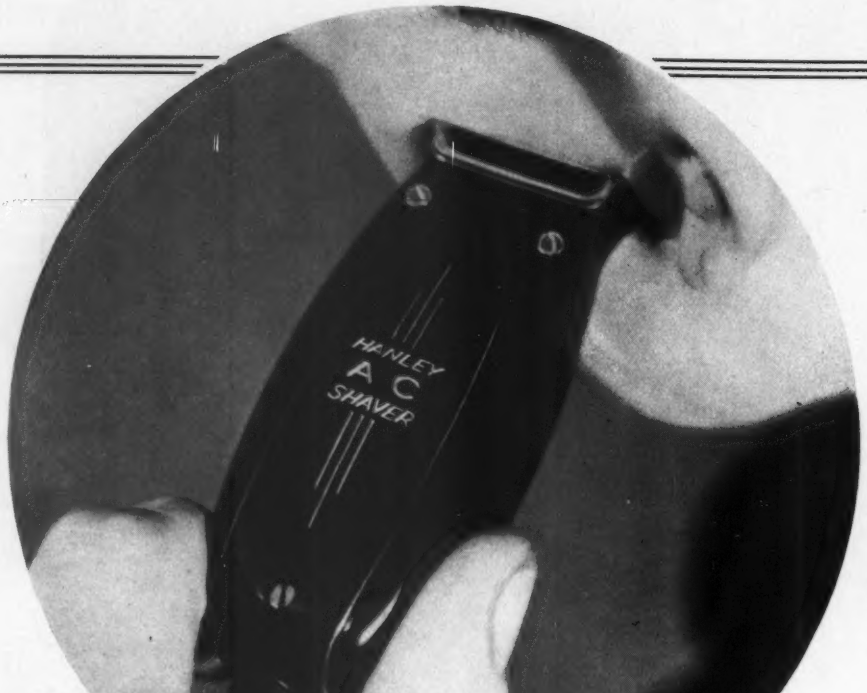

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Vol. III. No. 21 FEBRUARY, 1939

Plastics

Dealing with the Manufacture, Uses and Potentialities of Plastic Materials

Proprietors - - TEMPLE PRESS LIMITED
Managing Director - ROLAND E. DANGERFIELD

Editor - - M. D. CURWEN, B.Sc., A.I.C.
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Britain's Shop Window

IT seems strange to recall that in pre-war days there was no Fair in Great Britain which was representative of the nation and which could at all compare with the great European Fairs that have existed for centuries. Nowadays, at the annual B.I.F. at Olympia and at Castle Bromwich, we find not only the manufactured goods of this country displayed, but also those of many other parts of the Empire, and it expands steadily year by year. Indeed, it has this year so expanded as to overflow into Earls Court, and has gained so in world prestige as to attract buyers from the four corners of the earth. Britain is not only one of the great industrial nations of the world; its geographical situation makes it still the gateway to the West for Europeans and the gateway to Europe for the inhabitants of the Americas.

Once again there will be a plastics exhibit, happily so combined as to make it quite separate from the surrounding exhibits of other industries and so distinct from them in "make-up" as to create a sense of refreshing novelty. Nowhere in the Fair will there be found such a remarkable industry—a strange industry, if you like, for here it is under one roof, so to speak, and it produces the finished goods not for one industry alone, nor for ten industries alone, but for almost every one you can think of—electrical, motorcar, paint, building, fancy goods, furniture, decorative, hair-dressing, aircraft, packaging, printing, lighting, heating, refrigeration. Is there an industry for which it does not cater in some way or other? We doubt it. And if there is an industry for Pleasing the Public, or for Raising the Spirits of the People, or for Making the Public Colour Conscious, then, surely, the plastics industry plays a very worthy part.

Yes, it is a strange industry and a strange and delightful exhibition, where one can ask the self-same manufacturer to produce a complicated switch-gear or a miner's helmet, a modern telephone receiver or a lampshade in iridescent colours, an ivory and black cigarette box or a radio cabinet, a million tooth-paste tube closures in pale pink or a window frame. And he won't bat an eyelid!

It is rare to note a visible change in any industry from one year to another, yet the change that has taken place in the plastics industry is not only visible, but startling. With some truth it can be said that each and every concern in the trade has created something new and interesting. Some have made goods that never before were fabricated in plastics and exemplify what savings in time and money are made by the realization that an object, built up from many individual metal parts, can be made in one whole when plastics are employed. Others have introduced new materials that were not available for the B.I.F. last year. Many of the new advances we have described in the past year, within these pages, will be seen for the first time. Of special note we may direct visitors' attention to two newcomers to the plastics section, namely, Hydro-Plastics, Ltd., and Dap Manufacturing Co. Curiously enough, both these concerns deal with extruded materials, but with plastics of different types: the first named with thermo-plastic, and the second with thermo-setting resins.

On another page in this issue we give a fairly complete list of the exhibitors in this Plastics Section, together with a description of their special fabrications and a forecast of what will be seen on the stands. We urge all readers, then, to visit them and marvel, and we urge, especially, all industrialists in whatsoever industry they may be to examine carefully their own products and to estimate to what extent they can be improved by constructing them in some plastic material —there is one for every purpose.

Finally, we would welcome visitors to our own *Plastics* Stand, where information regarding trade and technical problems will be gladly given.

Moulded Plastic Tiles

ON another page in this issue readers will find an interesting article on the above subject by Mr. D. A. Dearle, manager of the Plastics Division of North and Judd Manufacturing Co. of Connecticut, U.S.A., who, incidentally, went to America from this country shortly after the war. It is, we believe, however unlikely economic production may be in the future, the first attempt at estimating the cost of the moulded tile and, as such, will be of considerable use. Naturally enough, being in the moulding industry, he has considered the problem only from one angle, namely, the production of tiles from the synthetic-resin moulding

powder normally used in the industry and as turned out in a normal press.

He has considered the problem as a comparison only between such a moulded tile and a slate tile. So far, so good, for there is a close analogy, since they could be made in the same size and both have smooth surfaces, which give high resistance to water.

However, the tale is by no means ended, for slate tiles are not the only ones on the market, and in this country are not, we believe, used in such quantities as the clay and the concrete tile. Moreover, the quantities are so vast that it would be worth while considering a new tile employing some special type of plastic. If we say that some 100,000,000 tiles or 200,000,000 tiles are used annually we do not suppose we should be less than 100 per cent. or 200 per cent. out, and by "out" we mean under the real figure. But the price of these clay and concrete tiles must force us to consider a tile totally different from that visualized by Mr. Dearle, since the clay tile is about £5 per 1,000 and the concrete tile, the sale of which has steadily increased in the past 10 years, is about £2 to £2 10s. per 1,000. So we see we are up against an entirely different proposition.

Moreover, anyone who has seen what a modern concrete-tile machine is like will realize that some similar plant would be more acceptable as part of the process. Here the raw material passes between pressure rollers on to moving steel pallettes at the rate of about two in 2 secs. or 3 secs. The pallettes are then removed to drying rooms.

Is it not, then, feasible to adopt a method in which an extremely cheap filler of a silicious nature is used, using a synthetic resin as a binder, the synthetic resin being used to the extent of some 1 per cent. to 2 per cent.? A pasty mass would thus be obtained, which could be extruded on a tile machine in a manner similar to the above. With ordinary synthetic resins there would follow a hardening process in a drying kiln. There is, in fact, one such process already patented, and we have in our possession a "Broseley" tile so made. The drying, or curing, is affected at a comparatively low temperature and not in the manner normally employed for clay tiles, which is at a temperature of 1,000 degrees C. or more. Using a sand-like material, which may be available at, say, 7s. 6d. per ton, we see at once that the cost of such tiles can be very close to the concrete tile. Tests carried out on the tile we have in our possession shows that the cross-break strength is about 200 lb., whereas the specification for the concrete tile is about 125 lb., a limit which the concrete tile rarely exceeds. The size of such tiles is 10½ ins. by 6½ ins. by ½ in. and the weight nearly 2 lb.

We have also seen a brick-like material recently which has been made by mixing a sand-like material with an emulsion of synthetic resin; the mass has been submitted to pressure and high temperature to produce an excellent material extremely hard and tough, and which would fulfil the specifications laid down.

No doubt the main cost of such a process would be in the kiln itself, where tens of thousands could be cured at once, and the heat required to carry out the curing; but it should not be outside the wit of man to introduce a more rapid curing and possibly eliminate entirely the heating process. Those in the moulding industry will realize that the problems of curing a mass, such as that described above, in which the resin is but a very small proportion and in which each particle of silicious material is thinly coated with resin, are very different from those which exist in a moulding ½ in. thick in an ordinary press.

With the preceding processes there is one drawback, namely, the difficulty of obtaining the finished tile impervious to water, and tiles normally undergo a water-pressure test before acceptance. Undoubtedly, by a proper selection of filler size, this could be overcome. The same drawback is not, of course, present in the case of the moulded tile described by Mr. Dearle.

Plastics in Education

AN educational exhibit chart describing, step by step, the manufacture of phenolic resins has recently been prepared by one of the largest plastics concerns in America, General Plastics, Inc., North Tonawanda, N.Y. It has been planned so that secondary school and college students will be able to see, almost at a glance, how one important grade of plastics is produced from phenol and formaldehyde. In addition to a diagrammatic chart, the exhibit contains finished examples of the ultimate applications of the phenolic resins. In this case Durez and small samples of laminated paper, brake-lining material and small mouldings are given. A concise story of the manufacturing process, as well as a list of current books on the subject, is provided in an accompanying folder. A nominal charge is made to scholastic establishments for these charts, which are in great demand in America, where they are used to supplement lectures on organic chemistry and to increase general knowledge.

Chairmen of educational committees in this country would no doubt welcome similar explanatory charts for secondary schools, and it might be a sound scheme for prominent manufacturers to give the suggestion serious consideration. It is not for us to stress the great publicity value of such charts, but it would undoubtedly be considerable. Their main value would, however, reside in the fact that they give the lie to the oft-repeated heresy that all plastics are made of some kind of pressed cheese. We can imagine the schoolboy of to-morrow correcting his father regarding the origin of the humble light switch. "No, father, that is not made of casein, or, as you put it, one of those new-fangled plastics from milk; it is, on the contrary, moulded of a cotton-filled and, therefore, shock-resisting phenolic moulding powder."

Plastic Milk Bottles

IN our October, 1938, issue we discussed the report that the production of milk bottles from cellulose acetate was under consideration. Many readers wrote asking for further information, but we were unable to supply it, since we knew little beyond the fact that a London financial group was interested in the project. This month we have a little more news and very much to the point. It is that a number of Reed-Prentice injection moulding presses have been sold in this country to a concern for the production of 3,000,000 cellulose acetate bottles a year.

This is most interesting, for not only does it show the method by which the bottles will be made (it had been suggested that the bottles might be blown rather in the manner of glass blowing), but it will be a production of articles of a size generally considered large for injection moulding.

Presuming that the weight of each bottle is roughly 2 oz., a total of some 170 tons of cellulose acetate will be needed during the year, which is not bad going.

Thanks to Plastics

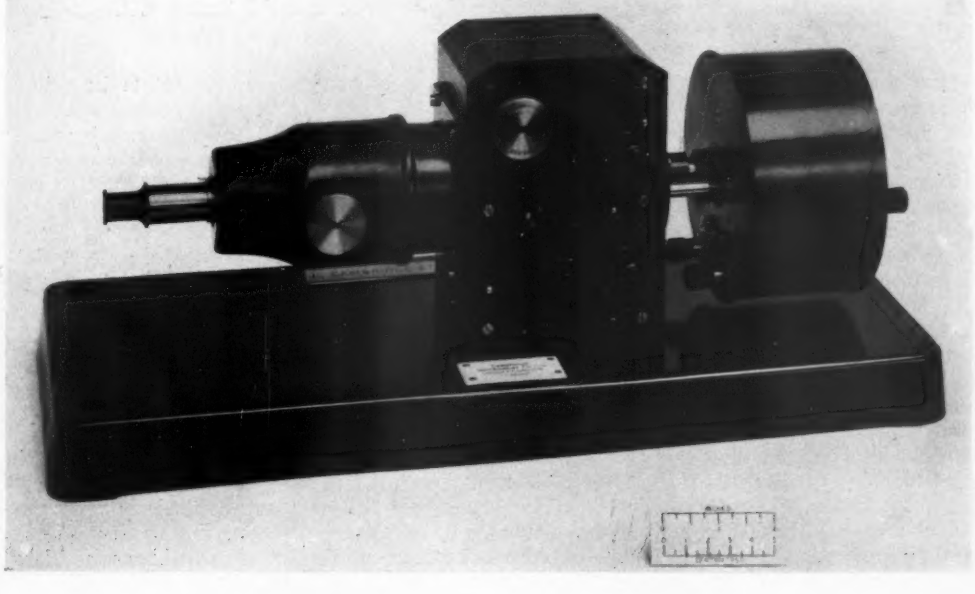
Yet another well-known manufacturer of specialized goods, this time scientific iustruments, finds that moulded cases for his extremely sensitive electrical apparatus not only afford better protection but improve appearance

IN the past manufacturers of sensitive and expensive scientific apparatus have been more than a little hesitant about the adoption of new materials for constructional purposes. It is only within the last year or so that the final barriers of conservatism have been broken down and manufacturers encouraged to examine impartially the claims of the new materials. Moulded cases for scientific instruments have the great advantage of being all-insulated and moisture proof, and thus fully able to afford the maximum protection to the delicate internal mechanism. In addition, the moulded housing is light in weight and pleasing in appearance, and requires no expensive enamelling or, indeed, any external treatment. It is surprising the difference the use of a Bakelite or similar plastic case has on the appearance of an instrument. In the first place, it looks more compact and is usually streamlined so as to eliminate sharp corners and awkward angles likely to be easily damaged.

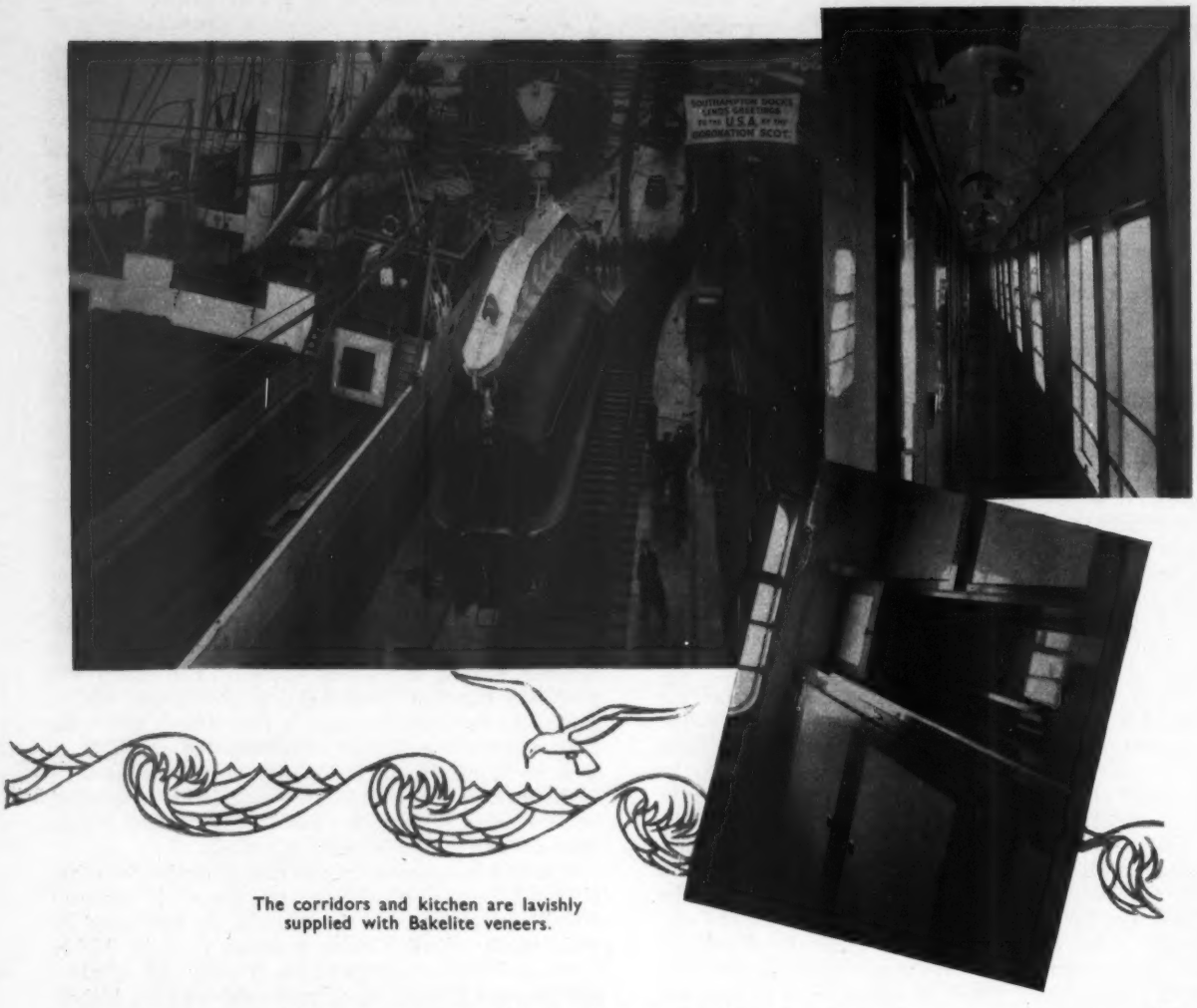
One of the most interesting examples of the new trend in scientific instrument manufacture is afforded by the Einthoven String Galvanometer, made by the Cambridge Instrument Co., Ltd., of London and Cambridge. This galvanometer was originally developed for incorporation in the well-known Cambridge Portable Electrocardiograph, which is widely used in hospitals and by medical men for investigating the action of the human heart, and it is now available for use as a separate galvanometer where the exceptionally high sensitivity of the Einthoven type is desired. The complete galvanometer with its associated optical system for magnifying and projecting the image of the fibre is mounted within a compact moulded case, which has a negligible temperature coefficient and helps to maintain a high degree of stability of calibration.

Manufacturers of time switches are also utilizing Bakelite housings, especially for their smaller types of switches. The Sangamo S.S. time switch is a good example of the plug-in type which is suitable for the control of street lighting, neon signs, shop-window lighting, heating and power circuits. The switch will plug into standard street lighting post boxes, and a feature of the Bakelite base is that it also forms the plug receptacle and thus eliminates the need for a separate terminal block. A wiring diagram is moulded in the back of the base, and the cover may be supplied either with or without a window. Provision is also made for external padlocking or sealing.

It would be possible to describe a number of other electrical devices which are now housed in compact Bakelite mouldings, but the two already mentioned do undoubtedly afford striking evidence that for highly specialized apparatus plastics are in every way suitable, and combine strong, robust properties with the highest degree of insulation and protection against the entry of moisture.



The Einthoven String Galvanometer is mounted within a compact moulded case.



The corridors and kitchen are lavishly supplied with Bakelite veneers.

THE "CORONATION SCOT" and PLASTICS—GO TO AMERICA

ONE of the finest and greatest of British trains, the giant "Coronation Scot," has arrived in the United States for show at the New York Exhibition. A monument to British engineering and a structure of surpassing beauty, it will serve to cement still further the friendship of the two English-speaking nations.

Built in 1937 to celebrate the Coronation of King George VI, it also represents 100 years of railway development, for it was on September 17, 1838, that the London and Birmingham Railway was opened. Nine years before, in 1829, Stephenson's "Rocket" had set up a record by travelling at 29 miles per hr. In 1937 the streamlined "Coronation Scot," which weighs 300 tons, travelled from London to Glasgow in 6½ hrs.

How travellers were accommodated in those far-off days we have some slight information. The carriages resembled rather something less comfortable than the modern cattle truck and the journey took on the aspect of an adventure fraught with considerable anxiety—of an occasion for tearful farewells to fond relatives.

It would be of considerable interest to be able to record the opinions of engineers and passengers of 1829 upon the "Coronation Scot." Stephenson's joy would be concerned, of course, with the marvels of the completely streamlined engine that can pull 300 tons over 400 miles at amazing speed. The passengers would probably comment on the interior comfort the train presents for their delectation, enviously, we feel sure; yet they might ghostily voice their opinions about the softness of the modern traveller.

In truth, there is a beauty and luxury about the modern train, and especially the "Coronation Scot," that creates a new era in modern travel. Moreover, it is an era in which plastics are entering into their own as a desirable material of interior construction.

When we first published some notes on the "Coronation Scot" in our July, 1937, issue, we noted that plastic materials were not particularly well represented in the structure. It is true that sundry ashtrays, the usual electric fittings, such as switchboxes and lamp

holders, were of moulded phenol resins, but there was little else. It is pleasing to record that since that day it is apparent that the constructors have taken wholeheartedly to plastics in the laminated veneer form. The kitchen and certain sections of the lounge have been wholly transformed by lavish use of Bakelite materials.

To take the kitchen car first. Here the hygienic properties of laminated veneers have been chiefly responsible for their introduction, for cleanliness must be visible, and ease of cleaning is of paramount importance. These veneers, with their brilliant, smooth, durable surface, highly resistant to moisture and in a wide range of colours, are admirably suited for the purpose.

The corridor, from which access is gained to the various sections of the kitchen car, is surfaced with Bakelite veneers in three shades, red, blue and cream. Up to window height the treatment is blue, a 1-in. band of red accentuating the change from blue to cream. The ceiling is surfaced with white Bakelite veneer.

As for the interior of the kitchen car, lavish use is made of Bakelite veneer in a grey-and-white mottle for walls, ceiling, facings of drawers, cupboards and doors.

The decoration of the lounge car is carried out in a very lively fashion. Here the cocktail bar is surfaced with red Bakelite veneer, this same material being used for the treatment of the serving counter behind. Several table tops of various shapes are finished in red with an inlaid design of blue and white strips. The doors in this car are surfaced with dark blue veneer, this colour being repeated in the window sills and frames.

A beautiful example of resin-impregnated laminated veneer carried out with a pictorial design, is seen on the back walls and doors that surround the bar itself. The structure in this instance is Warerite veneer, made by Warerite, Ltd., of Ware, the design being in the form of a humorous picture (see below), showing the consternation caused by a fearful steel monster among an affrighted populace of the 1840s.

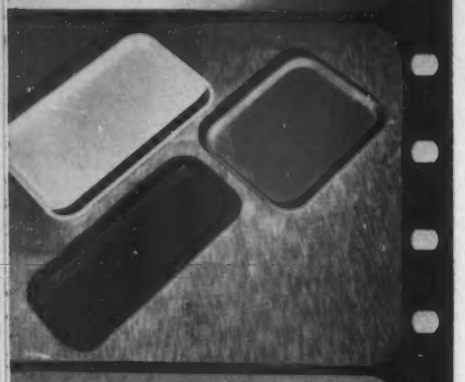
A view of the lounge car with table tops and doors of Bakelite veneer.

The designs in the lounge car were prepared by Mr. Brian O'Rorke, A.R.I.B.A., while the kitchen car was designed and executed by the L.M.S. authorities. Altogether, this magnificent train will maintain the best traditions of British workmanship at what must be one of the greatest exhibitions ever held.

"General Release"—I

New and Interesting Plastic Goods

AT the recent Exhibition of the Physical Society, South Kensington, London, this ingenious inspection torch, made of Tufnol, was shown at the stand of Ellison Insulations, Ltd. It overcomes the obvious disadvantages of metal and is perfectly safe in use for examining oil and petroleum containers.



TRAYS such as these are always finding new uses, and we understand that an increasing number are being utilized in confectionery and other shops selling food. The material used for moulding is Beetle, in plain and mottled colours, and the work is carried out by the Streetly Manufacturing Co., Ltd.

HERE'S a useful and dainty-looking condiment set moulded of Bandalasta by Brookes and Adams, Ltd., and designed to improve the appearance of the breakfast or dinner table.

WE imagine that this green onyx toilet set, made of Xylonite by Halex, Ltd., a subsidiary of the British Xylonite Co., Ltd., would make a very welcome birthday present. The five-piece set in a lined leatherette-covered case retails at 84s.

THE deaf-aid device illustrated is encased in a most ingenious moulding manufactured by Healey Mouldings, Ltd., Birmingham, for New Hearing, Ltd., also of Birmingham.

MANUFACTURERS of business-efficiency machines now make generous use of mouldings in the production of their equipment. The casing for the adding machine illustrated is representative of the work now being done in America. The case measures $7\frac{1}{2}$ ins. in height by $15\frac{3}{4}$ ins. by $8\frac{7}{8}$ ins., and is moulded by the Gorham Co. of Rhode Island, U.S.A.

"General Release"—II

New and Interesting Plastic Goods

THIS high-pressure thermometer, equipped with a metal tube for insertion in steam pipes, has an attractive shield or guard moulded from Textolite by the General Electric Co. of America.

MOULDED door furniture is being used on an increasing scale in modern furniture production. These well-designed specimens of Catalin-ware deserve to be widely known to the furniture trade, as their use would certainly add to the attractiveness of sideboards, dressing tables and wardrobes.

THIS Bandalasta butter dish enjoys a good sale at the better-class stores and is sturdily and yet attractively designed to give good service under all normal home conditions. Brookes and Adams, Ltd., of Barr Street, Hockley, Birmingham, are the moulders.

MOTORISTS will be well advised to purchase, or even borrow, one of these useful Bandalasta picnic boxes, which, besides being hygienic and very compact, certainly do keep food cool during the hot weather. Brookes and Adams, Ltd., Birmingham, are the moulders.

THIS attractively designed stationery box, measuring 8½ ins. in length, is moulded in America by the Plastic Division of the Gorham Co. of Rhode Island, and helps materially to improve the sale of high-class stationery.

THE standard black Coronation telephone has been previously illustrated in this journal, but this is the first time the ivory model has been shown. Moulded Products, Ltd., Birmingham, are responsible for the moulding, and are to be congratulated for a fine piece of work.

EXTRUDED PLASTICS FOR THE ELECTRICAL INDUSTRY

RATHER less than a year ago a new industry, of vital importance to the electrical industry, began in this country. It was begun because of the availability of what are chemically called the poly-vinyl chloride plastic materials, and because of two extremely important facts; first, the excellent properties of the raw material from a chemical point of view and, secondly, the fact that it can be extruded, from a suitable nozzle or die, in tube or rod form and at the same time extruded around a copper or other electrically conducting wire.

As for the nomenclature of these compounds, it may be explained that vinyl chloride is a simple chemical liquid made from acetylene; but by the action of sunlight, or certain chemicals, the small molecule of vinyl chloride is made to combine with itself, so to speak, forming a compound of much larger molecules. When an organic compound changes in such a manner, it is termed a polymer of the original and, of course, changes its form. Thus vinyl chloride becomes solid and rubbery and the new material is called, chemically, poly-vinyl chloride, the prefix "poly" merely meaning "many."

The thermoplastic poly-vinyl chloride compounds have so many good properties that the near future will give this material a big field of application. Convinced of the great advantage for all kinds of technical, chemical, and electrical insulation, Hydro-Plastics, Ltd., of Putney, London, have carried the development a considerable stage farther in the form of sleevings, wires, and cables, which development is of exceptional interest. The material of this firm is manufactured under the trade name of Tenaplas and is finding a large market in this country.

These Tenaplas compounds by their oustanding electrical and physical properties and their excellent chemical resistance provide a medium of insulating of great significance. They are not attacked by mineral or vegetable oils, resist atmospheric conditions, do not age or fade, and resist most acids and alkalies.

An outstanding feature of the compound is its non-inflammability. It, however, softens if exposed to elevated temperatures, but it does not flow; it is, however, liable to deform if mechanical stress is applied simultaneously.

The degree of flexibility varies from a very soft rubber-like condition to a rigid horn-like texture, and the compound can be plasticized to retain its flexibility under very extreme conditions of cold. The material is manufactured in a wide range of colours, including that of multi-colours. Owing to its superior electrical properties the compound imparts a maximum of electrical insulation with a minimum wall thickness.

The breakdown voltage of the compound is within the range of 30,000 to 40,000 volts per millimetre wall thickness. Thus, for example, Tenatube, Fig. 1, with a wall of .35 mm., resists A.C. tension of 10,000 volts; it can be extruded in endless lengths from .5 mm. to 1 in. and over inside diameter in the form of tubes, ovals, squares and even fluted tubings.

In the form of covered wires a great advantage lies not only in the high electrical properties, but no further insulating material is necessary as, for instance, cotton, silk and paper, and conductors are easily stripped without having to cut away superfluous materials. For the normal 230 voltage a wall thickness of between .5 mm. and .8 mm. is invariably used. For lower voltages the wall thickness can be reduced to .15 mm. Flexes from 7/46 gauge up to 195/33 and higher, and single wires down to a gauge of 33 are within the range of the extruding process.

Fig. 2 reveals a push-back type of insulation, the sheathing can easily be slipped along the conductor to permit of easy soldering.

Fig. 3 shows an example of multi-core cable which represents an assembly of three and five cores of Tenawire with or without additional filling of cotton or other textile, on to which is extruded a sheathing of Tenaplas which forms a uniform mantle for such a cable, and provides for the production of oil-proof multi-core

cables in any colour and of unusual flexibility. In the case of high frequency such cables are electrically screened by additional copper braiding, and on to this copper braiding a further textile braiding is woven and impregnated with a Tenaplas solution.

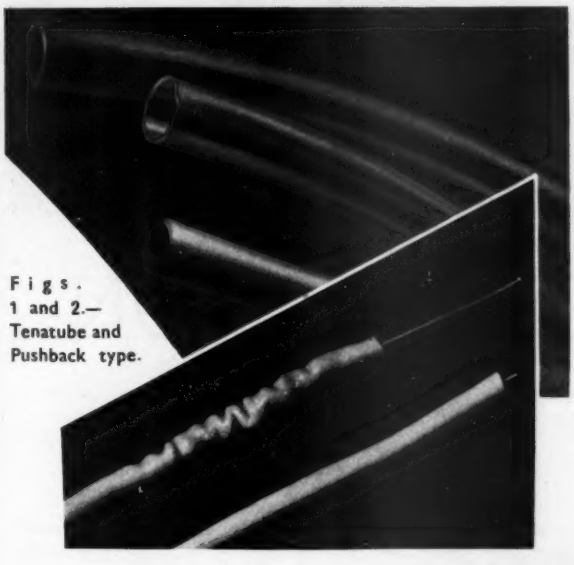
Fig. 4 represents a twin stranded wire called twin-flat. The advantage of this design can be seen in the fact that the distance between the two single wires or strands is maintained throughout the whole length. The electrical property of Tenaplas provides also the essential quality demanded for high-frequency purposes. Such twin-flats are used as high impedance feeder cable.

Fig. 5 and that seen at the top of the previous page represent 6 mm. and 12 mm. low capacity cables marketed as Lokap and Lokatube, specially suitable for all high-frequency applications, and this design provides for the production of endless lengths. Another advantage is that the conductor is suspended exactly concentric in the middle of the cable which guarantees an equally low impedance value along the whole length of such cables. The Tenaplas material provides for working with minimum material and maximum of air space which ensures the lowest capacity between the outside braiding and the middle conductor. Fig. 6 indicates the very thin supporting wall which would be impossible in any other flexible material.

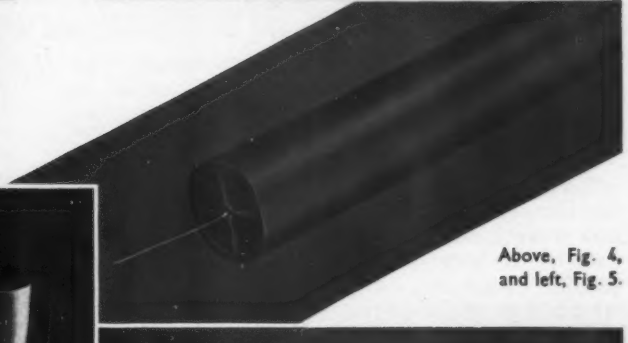
Fig. 6 represents a form of extruded tape in golden brown suitable for the construction of shoes, hats, and decorative purposes.

Fig. 7 represents ¾-in. internal diameter extruded tube for covering hand rails and the like; the tube is inserted on to the metal conduit and anchored by the application of an adhesive.

It would appear that in Tenaplas materials a solution may be found for many technical and decorative problems for which hitherto no suitable material has been available. Already they are meeting many specialized requirements in modern industry.



Figs. 1 and 2.—Tenatube and Pushback type.



Above, Fig. 4, and left, Fig. 5.

Fig. 3.—Multicore cable of Tenawire.

Fig. 7.—Extruded hand-rail tube.

Fig. 6.—Examples of extruded tape for decoration.

The PLASTICS SECTION

The following notes give short accounts of the stand holders in the Plastics Section at Olympia and in Birmingham. On page 49 is included a map showing the disposition of the London Exhibits

H. E. Ashdown (Birmingham), Ltd. Olympia Stand No. A.741

During a recent visit to the works of this company, late last year, we were privileged to see the extensive new works that have recently been erected to deal with the increased business now being undertaken for various branches of industry. The new work entails not only the use of great new presses, but also of the latest type of automatic and semi-automatic injection machines.

It will be remembered that it was in these factories that the first motorcar window frames and facia boards were first manufactured for the Ford and the Hillman companies. It was a noteworthy section of their last stand at Olympia, which displayed window and door frames in a variety of light colours, to show the motor industry how readily the plastics industry could deal with any demand on its part with respect to colour. Here, also, were shown some new moulded tables.

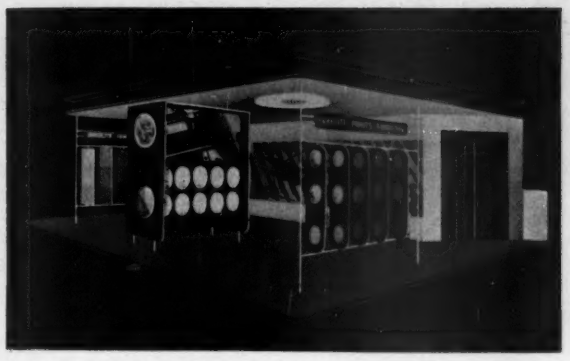
It is interesting to record that Mr. L. Jex-Blake Forbes, director of Ashdown's, recently read a most illuminating paper on the present and future of plastics before the Nottingham Society of Engineers.

Bakelite, Ltd. Olympia Stand Nos. A.763/769 Birmingham Stand No. Cb408

A hollow-moulded airscrew, which is one of the largest mouldings of its type ever to be produced, will be shown on the stand of Bakelite, Ltd., at the Birmingham section of the British Industries Fair. This plastics airscrew, which has been developed in conjunction with the De Havilland Aircraft Co., Ltd., is of particular interest at the present time, when attention is being focused on the possibility of producing planes largely from plastic materials.

Another feature of interest, particularly to the paint manufacturer and user, will be an animated display which illustrates the ability of paints based on Bakelite resin to resist attack by normally corrosive agents. Several metal plates which have been protected with finishes of this nature will be automatically immersed in, and withdrawn from, a 5 per cent. solution of caustic soda. It will be seen that Bakelite resin paints are capable of withstanding even this drastic treatment.

Bakelite decorative sheet plays an important part in the construction of both the Birmingham and London stands, while individual exhibits will indicate the wide colour range available. A development which will undoubtedly attract attention is the reproduction of murals, consisting of artists' original drawings or photographic enlargements as an integral part of Bakelite decorative sheet. On the London stand there will be a large mural occupying a complete wall. A recently developed electrographic process enables enlargements of any original in colour or monochrome to be reproduced. Two other devices in London which will catch the eye are a kaleidoscope and special colour-matching apparatus. The former will present a complete series



A drawing of the Bakelite stand as it will appear at Olympia.

of continually changing colours and patterns, so indicating the colour range and potentialities of Bakelite decorative sheet in modern design. The colour-matching device consists of two discs, the smaller and upper of which is rotatable. Segments of Bakelite veneer are mounted on the discs, so that any two or combination of colours can be brought into juxtaposition in order to judge their effect.

The application of laminated materials in the engineering sphere is assuming a rapidly increasing importance. For slow-running shafts, bearings in laminated material have many advantages to offer over phosphor bronze, white metal or similar types of liner. Examples of modern bearings produced in this manner will be shown on the Birmingham stand, and various types of gears and other engineering equipment will be included on both stands. A selection of mouldings will also be included, together with electrical insulating varnishes, lacquers, cements, etc.

British Industrial Plastics, Ltd. Castle Bromwich Stand Nos. Cb506 and 607

British Industrial Plastics, Ltd., are exhibiting with their three subsidiary companies on an island in the Electrical Section of the British Industries Fair at Birmingham.

The companies and their exhibits are as follow: British Industrial Plastics, Ltd., Mould-making Division, Tyburn Road, Erdington, Birmingham, will be showing steel moulds and dies. The Beetle Products Co., Ltd., Oldbury, Worcs, will be showing examples of Beetle, Pollopas and Scarab moulding powders, also Beetle Transparent. Examples will be shown of mouldings made by their customers from these materials and will include radio cabinets, telephone parts, fan mouldings, lines for the electrical industry, electric-fire housings, model trains, lines for the cosmetic trade, soap containers, door furniture and furniture fittings, in addition to a whole range of other items.

They will also be exhibiting urea-lacquered resins and striking examples of lacquered panels in which urea resins have been used.

The third constituent company, the Streetly Manufacturing Co., Ltd., Streetly, Sutton Coldfield, near Birmingham, are the moulding firm in the group and will be exhibiting mouldings made from Beetle, Bakelite and Scarab and Beetle Transparent, and also extruded tubing in Beetle and Scarab and Beetle laminated sheet.

Mouldings will include electricity meters, electric fittings and parts, including switch plates, fuse boxes, radiator handles, vacuum-cleaner parts, radio cabinets in Beetle and Scarab, scale housings, trays, lamp bowls, clock containers, funnels, novelty containers for cosmetic trade, soap bowls, denture baths, sweet containers, butter slabs and many other lines.

Examples will be shown of lamp shades made from Beetle sheet, as used by the Admiralty.

The offices on the stand will have the walls panelled with urea sheets made from Beetle resins, and one wall will be covered with panels made from lacquers of which urea resin is the base.

E. K. Cole, Ltd. Olympia Stand No. A.756. Birmingham Stand No. Cb611

The stand of E. K. Cole, Ltd., in the Plastics Section is designed to demonstrate the facilities available at the Southend-on-Sea moulding plant rather than to show articles manufactured for sale.

Many of the mouldings displayed are readily identifiable as being from large official and industrial contracts, and the versatile nature of the exhibits demonstrates how wide has grown the application of plastic materials in recent years.

On view are some of the largest contemporary mouldings, such as heater and radio cabinets and table tops more than 2 ft. in diameter. Mouldings up to 12 lb. in weight, with dimensions showing a potential projected area of about 5 ft. by 3½ ft. can be produced at the Ekco plant. A typical example in actual production is 34 ins. by 18 ins. by 11 ins.

Other interesting exhibits are one-piece framings of intricate shape and section; mouldings from split and threaded dies to .001 in. accuracy; precision tapping and insert work, and examples of accuracy in alignment of fixing bosses and mountings over a large moulding area.

Among the industrial mouldings shown are prepayment slot meters, junction boxes, sealing chambers, telephone parts, electric-razor casings, a wide variety of bobbins, formers and tubes, fuse boxes, plugs, adapters, switch cases and a vast number of miscellaneous mouldings intended for integral mounting in all types of production assemblies.

As one of the largest consumer-moulders in the country, E. K. Cole, Ltd., naturally show examples of mouldings produced for their own Ekco Radio and Thermovent heater products. In these can be seen interesting uses of colour in large-scale mouldings, and also of the attractive decorative effects achieved by chromium-plating the moulded surfaces.

Mouldings produced from coloured powders are shown in red, green, black, walnut, cream and blue, together with a wide choice of mottled effects. In some of the radio cabinets two or more colours are combined.

E. K. Cole, Ltd., are prepared to undertake the moulding of a quantity production of any article suitable for this process, and the extent of their plant and the size of the individual presses make it possible for them to offer facilities probably not available anywhere else in the country.

Combined Optical Industries, Ltd. Olympia Stand No. A.758

From the time this company was first organized in 1937 we have taken a keen interest in its fortunes, and we have, therefore, considerable pleasure in hearing that production is now under way.

There is little doubt that when the objects of this concern were first published there was some scepticism

that the moulded lens was at all possible. When, therefore, the claim was made that, not only was it possible but that lenses of the very highest quality from synthetic resins by a moulding process had, in fact, been accomplished with complete success, the importance of the manufacture was at once visualized. The mass-production of optically accurate lenses for the fabrication of binoculars is, of course, one of national importance, and success of this concern frees us in large measure from dependence upon foreign countries, a condition which did not diminish confusion in our war preparations in 1914.

The lenses in question, for binoculars, opera glasses and cameras, are constructed and moulded from special transparent resins, such as Perspex, and since this resin is not as hard as glass a special surface-hardening process had to be developed to prevent scratching. Such a process has now been perfected to the satisfaction of the lens-using industries, and we presume we shall see at this stand the most recent developments that have been made.

Crystalate, Ltd. Olympia Stand No. A.762

Crystalate, Ltd.—pioneers in 1899—are one of the most progressive firms in the industry.

Crystalate's advance during recent years as moulders of modern plastics has been phenomenal.

They have always made a feature of the mould-making side of their business and it is one of the comparatively few companies in the industry who manufacture their own moulds. The advantage to the consumer is obvious inasmuch as Crystalate control the production of the moulding from start to finish.

They have adopted a policy of keeping abreast of all developments and their plant, which is very extensive and entirely modern, is one of the finest and most up to date in the country.

We hope shortly to publish an article illustrating a visit to their works, which cover an area of 7½ acres at Golden Green, near Tonbridge, Kent. The whole of this large factory is solely devoted to the production of plastic mouldings.

At a recent interview Mr. R. L. A. B. Morten, O.B.E., a director, explained that new opportunities for the use of plastics in replacement of wood, metal, card, etc., are being found almost daily. Accordingly, readers who may not at present have envisaged the use of plastics in their business should investigate the possibility of doing so.

Crystalate, Ltd., will cordially welcome customers and prospective customers to their stand at the B.I.F., where a large variety of mouldings illustrating the wide ramifications of recent developments of the industry will be displayed.

Dap Manufacturing Co. Olympia Stand No. A.757

We welcome this company as newcomers to the Olympia circle. It has, moreover, developed a peculiarly special branch, as we indicated in our November issue, for it has introduced plastics to the building trade in the form of extruded rods and tubes suitable as curtain runners, and similar applications. Details of the stand are not available at the time of going to press, but no doubt many of the exhibits will be similar to those seen at last year's Building Exhibition, and it is to be hoped that they will attract as much attention.

Erinoid, Ltd. Olympia Stand No. A.759

Special interest will be taken at this stand because of the extent in which this company has expanded its manufactures to cope with the growing demands of the plastics-working trades.

As our readers know, this company was more or less completely concerned until recently with the production of Erinoid, the casein plastic, only. But a few years ago the first plant for the production of cellulose acetate under the trade name of Erinofort was erected and moulding powders and sheets were marketed; to-day a very modern plant producing Erinofort in the form of foil is working on a manufacturing scale.

Concurrently, synthetic resins for the varnish trade have been produced under the name of Erinile and Erinol. These are phenol-modified resins of the oil-soluble type which have been wholly welcomed by the trade. Lastly, we may mention Erinoplas, which we described in our September issue. This is a cast resin which is made under the company's own patents and is now being shown and marketed for the first time.

At this stand there will, of course, be shown the complete range of Erinoid products.

Ebonestos, Ltd. Olympia Stand No. A.743

This company, whose history goes back to the earliest days of plastic fabrication, when they were limited somewhat to bituminous mouldings, generally springs a delightful surprise at the B.I.F. by exhibiting the high-spot of their manufacture, generally something which the outside world has not yet seen. Last year it was that very remarkable moulding made from Diakon, in the form of a 30-mile-an-hour sign, and composed of some 17,000 tiny lenses for reflecting light from oncoming cars. Presumably we shall see other interesting innovations at the forthcoming Fair. There will also be a wide selection of mouldings of all types of electrical and general utility in bituminous asbestos mixtures, as well as the more recent synthetic resins.

Thos. Firth and John Brown, Ltd., Birmingham. Stand No. D.619/518

This famous firm of steel manufacturers is one which has set out especially to accommodate the plastics industry in its demand for special steels for making dies. For this purpose Nitralloy steel is now famous and very widely used. Readers may, perhaps, remember that, at last year's Castle Bromwich Show, this company showed the dies used for the production of a famous radio cabinet. Other exhibits of interest indirectly to the plastics industry will be the Engineers' Tool Department, which is represented by a range of files, machine tools, "Speedicut" high-speed steel drills, reamers, cutters, butt-welded lathe tools, saw blades, and the Firth Hardometer Hardness Testing Machine. The heavy side of its manufactures will be represented by die blocks and various applications of Nitralloy steel.

F. A. Hughes and Co., Ltd. Olympia Stand No. A.775

This company are essentially raw material manufacturers and have been responsible for introducing into this country some of the latest type of synthetic resins, especially of those derived from vinyl chloride.

Their materials are used extensively for the production of all types of articles, and apart from the three main qualities of Rockite thermo-setting synthetic

(Continued on page 49.)

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mouldings (each of which has its own sphere of application) a large range of powders for more highly specialized uses are available. Some of the articles made from these, such as radio cabinets, meter cases, etc., will be displayed on the stand.

The following will also be on view: Part of the large range of Rockite impregnating and laminating resins made for high-grade insulation and examples of what are made with them, namely, laminated sheets, insulating bushes and impregnated wood used for a variety of purposes, such as aeroplane parts, panels, etc.

There will also be on show a number of extruded tubes and sections made from Rockite by the Rockhard patented process, suitable for a number of purposes, such as handrails, beadings, etc. Large-diameter tubes can be produced by this process, and a tube approximately 4½ ins. in diameter will be on view.

Another extremely interesting development on this stand is that devoted to injection mouldings manufactured from Cellomold—the well-known cellulose-acetate thermo-plastic compound.

Finally, there will be seen here examples of Mipolam, the comparatively new thermo-plastic resin of the polyvinyl chloride type (derived from acetylene as a raw material), and a display of cables and wires insulated and sheathed with this material.

Insulators, Ltd. Olympia Stand No. A.761

Once again Insulators, Ltd.'s stand at Olympia is given over to a display of mouldings whose intricacy and attractiveness reaffirms without any doubt their claim to the slogan of "Mouldings of Merit."

Their products are in use in practically every sphere of the electrical, engineering, radio and domestic-appliance industries, and increasing uses for plastics have resulted in the following attractive additions, among many others, to the firm's successful productions.

The "Sussex" Water Softener has been made throughout in Bakelite and is the only one of its type in the country; it has met with instantaneous success because of its efficiency, "good looks" and competitive price.

The "Automobile Association" Container was devised with the co-operation of the designs department of Insulators, Ltd., and is an excellent example of sound design in plastics; this is a Bakelite adaptation of the handbook container on which the moulded replica of the familiar "A.A." badge is worthy of note.

The "Radicon" Cigarette Casket is an exact miniature to scale of the famous "Radicon" Worm Reducer and may be considered as a splendid triumph of accuracy and mould-making, and one of which Insulators, Ltd., is justifiably proud.

An imposing number of display stands in all sizes and colours, used by the foremost cosmetic houses in the country, are among the exhibits. Also an array of large technical mouldings and switchboxes, formers, instrument cases, etc., accompanied by an interesting selection of injection mouldings from their automatic plant.

Thomas de la Rue and Co., Ltd. Olympia Stand Nos. A.744 and 755

Messrs. De la Rue have specialized for some time in the production of large-size moulded pieces, both in thermo-setting and thermo-plastic materials, and their plant for the production of these large mouldings has increased considerably during the year.

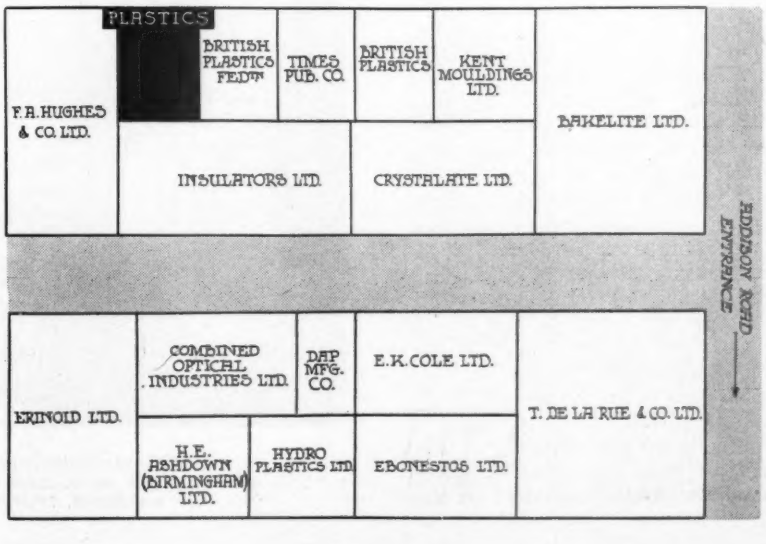
Mouldings of this description will be shown at the British Industries Fair, and a large range of their latest productions, illustrating all types of plastic moulding, will also be on view.

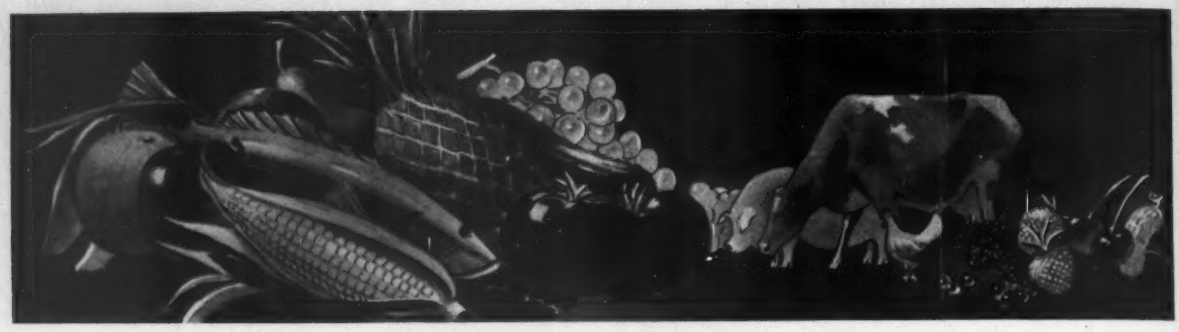
At the same time, mouldings in thermo-plastic materials have also increased in size, and there will be a special section devoted to the display of articles of this type. The display will also include a range of articles, including line insulators, in the well-known Telenduron material manufactured by De la Rue.

"Plastics," Temple Press Ltd. Olympia Stand No. A.774

Lastly, we may mention our own stand, where a large number of past issues of this journal will be on show and where we shall be glad to answer inquiries, technical or otherwise, regarding the plastics industry.

A perusal of the pages on exhibition will give a very lively view of the range and capabilities of the raw materials employed and of the forms in which they can be manufactured.





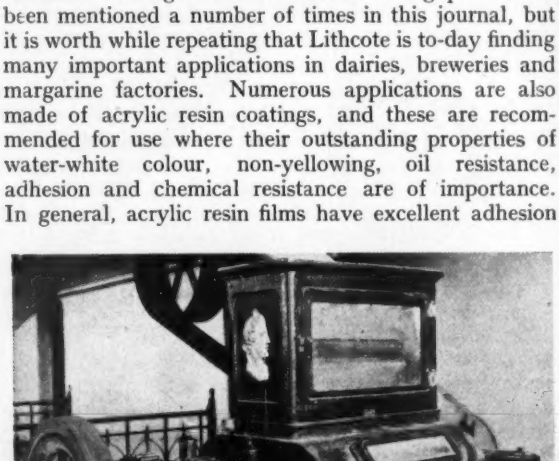
PLASTICS IN THE FOOD INDUSTRY

ENGLAND owes its greatness to many things, not the least of which is the health and vigour of its people, who to-day enjoy a higher standard of living than anywhere in the world, with the possible exception of America. The credit due for the wholesome, abundant and infinite variety of foods that grace the average dinner table in this country is due to several groups. First of all, the farmer, either at home or in the Empire, where an increasing percentage of our food is obtained. Equally important are the food manufacturer, packer and preserver, who have made available the products of field and orchard, from oceans and from foreign lands. The words "out of season" are now completely out of date, as applied science enables almost every type of food to be preserved and made available for distribution throughout the world.

This type of Mipolam tubing is used in the food industry. It is completely immune from corrosion and ensures freedom from metal contamination.

The role of plastics in food manufacture is yearly becoming more important, especially for those processes where metallic contamination has to be avoided at all costs. It should be remembered that practically all metals contain small percentages of lead and arsenic, which may find their way into foodstuffs and exceed the limits of a few parts per million allowed by the authorities. In the brewing industry, pipes for conveying fermented liquors used to be, and are still, made of expensive pure tin, as ordinary tin-plated metal is subject to corrosion owing to the great difficulty of producing a tin coating free from tiny pinholes, which become centres of insidious chemical activity. It has been suggested, as the result of experience in Germany, that pipe lines extruded of one of the vinyl chloride plastics, such as Mipolam or Koroseal, would be ideal for brewery and other plants. These new materials are absolutely immune from chemical attack and enjoy all the advantages of glass and ceramics without their hardness and fragility. Indeed, the vinyl chloride group of plastics is characterized by the flexibility and toughness of the materials and their ability to be extruded into pipes which can be bent to any desired angle or curve.

Plastic coatings for food manufacturing plant have been mentioned a number of times in this journal, but it is worth while repeating that Lithcote is to-day finding many important applications in dairies, breweries and margarine factories. Numerous applications are also made of acrylic resin coatings, and these are recommended for use where their outstanding properties of water-white colour, non-yellowing, oil resistance, adhesion and chemical resistance are of importance. In general, acrylic resin films have excellent adhesion



On applications such as this malt mill, where gear centre distances cannot be accurately maintained, Micarta is superior to metal.

This Rowntree's pastilles container is moulded of Beetle by the Streetly Manufacturing Co., Ltd.

Jelly moulds of Beetle by Streetly Manufacturing Co., Ltd. These are sold in some of the large multiple stores.

to most surfaces and show good heat resistance, withstanding temperatures as high as 350 degrees F. without discoloration.

Experiments with laminated gears in the food industry have been very promising, as practical trials have shown them to be as silent as those previously made of rawhide, and able to give a longer service under exceptionally difficult running conditions. One great disadvantage of rawhide gearwheels is that they are easily attacked by rats and do, in fact, attract these vermin. The silence of laminated gears is now well known. They operate quietly, principally because of their resilience. Where metal gears cause noise and vibration when the load passes from one pair of gear teeth to the next, the high resilience of such materials as laminated Bakelite, Tufnol and Micarta absorb these shocks. Tooth deflection (approximately 30 times that of steel) absorbs the impact instead of transforming it into undesirable vibration and noise. Laminated boards are also used for covering the tops of work tables in preference to zinc or enamelled metal, which wears rather badly. The plastic material has a surface that is smooth and pleasant to the touch, perfectly hygienic and resilient enough to reduce breakages if glassware containers are accidentally dropped on it. In addition, it is able to withstand indefinitely the attack of water, oil and moderate acids and alkalies.

For the coating of refrigerators and a good deal of the exterior of manufacturing plant, alkyd resins are now being widely used. The alkyd finishes are able to bake out to a high gloss, flow out smoothly and yet possess sufficient toughness and flexibility to prevent chipping; at the same time, they do not discolour during baking. There is no doubt that these new finishes are taking the place of the old enamels previously used for finishing manufacturing plant.

In the packaging of foodstuffs, plastics are being employed to an increasing extent. We are all familiar with the moulded caps used for sealing jars of pickles, sauces and other preparations, and the popularity of these is still increasing.

Every packer of quality foods goes to an infinite amount of trouble to see that they leave his factory perfect. Processing equipment, cookers, vacuumizing machines, automatic thermostat control, costly efforts to ensure perfect cleanliness and sanitation—all these count for nothing if the package is not so perfectly sealed that it carries the product safely through from the factory door direct to the consumer's kitchen. This may take a period of months, or maybe a year or so, during which time the caps that seal the packages must resist extremes of cold and heat, atmospheric moisture or dryness, entrance of micro-organism of mould and decay, and the internal chemical action on the cap of reactive or corrosive ingredients of the food. Tin-plate is liable to be attacked by fruit acids, vinegar, mustard, foods packed in brine, etc., and even aluminium, now freely used for making screw caps, is not completely immune from attack. Moulded caps are able to afford the maximum protection to the most difficult foods and for this reason they are being preferred by many manufacturers in this country who wish to combine attractiveness with the fullest protection.

One of the most important of recent developments in the application of plastics for use in food manufacture or food packaging is the new odourless moulding material produced by Bakelite, Ltd. In the past, mouldings from phenolic material have sometimes exhibited a slight odour, which has handicapped their use for applications where they are liable to come into direct contact with foodstuffs. The odourless material now produced by this company thus enables the well-known advantages of phenolic materials to be retained, while the contents of the container in which the material is incorporated are in no way contaminated. It is also worth noticing that the Lithcote process of lining storage tanks, etc., is based on Bakelite resinoid.

The development of a special odourless phenolic moulding material for the food industry is yet another example of the way the plastics industry is trying, not unsuccessfully, to adapt itself to modern industrial requirements. It should be realized that the basic plastic materials, both thermo-setting and thermo-plastic, can be altered by the chemist to suit particular requirements, and this is being done far more often than might be supposed.

Moulded containers for foods have come into prominence during the past year or so. One of the most interesting developments is the use of decorative moulded caskets for confectionery products, such as the Scarab container for Rowntree's pastilles, moulded by the Streetly Manufacturing Co., Ltd. This container was on the market at Christmas. Other interesting items which the same firm has moulded for holding foods include two types of jelly moulds, condiment sets, butter dishes, etc. Containers moulded of amino resin powder have also been used for packing ice cream.

Cellulose acetate containers for dried products, such as tea, coffee, cocoa, spices, etc., are very suitable and, indeed, packs for coffee are now available in France and were described in our issue of July, 1938. The advantage of the injection moulded acetate pack is that the product may be packed in it under vacuum and the container hermetically sealed by heat. The process is adaptable to mass production and appears to have interesting possibilities for a number of different products. A great selling feature of the acetate container is that it is perfectly transparent and yet flexible and strong. There is little fear of damage to the pack if it is accidentally dropped and bulk packing becomes a comparatively simple operation.

The cellulose acetate milk bottle is still receiving consideration in various commercial circles, and we understand that opinion is favourable towards its chance of competition against glass. It might here be mentioned that both cellulose acetate and also Perspex find several applications in the food factory itself. Reinforced Rhodoid and also the well-known Armourbex are used for shatterproof windows, and Perspex is also made up into shields for the electric light bulbs used in sugar factories, where there is always a risk of the sugar being contaminated with glass splinters.

Numerous odd mouldings find interesting uses in the food industry. In America, for instance, beer taps, according to many state laws, must be identified, so that bartenders cannot substitute one brand when another is called for. Now moulded beer knobs are being used, and they fulfil all requirements. Most of these knobs are moulded hollow, and an embossed metal plate is snapped into the circular recess to carry the brewer's name. Moulded trays also find extensive applications in shops retailing food, and their clean, hygienic appearance does much to enhance the appetizing appeal of the confectionery, meat products, etc., displayed on the counter or in the window.

It is interesting to note that quite apart from moulded food containers, of which there are now a large number, polyvinyl acetate is widely used in America, and to a limited extent in this country, for sealing paper drinking cups and milk containers. Its excellent adhesive qualities, coupled with complete lack of colour, odour or taste, make it in every way suitable for this purpose. Vinyl resins are also highly satisfactory for fabricating liners for food, drug and cosmetic containers, because they are non-toxic, tasteless, odourless and chemically inert to the action of acids, alkalies, alcohols, oxidizing agents, oils, fats and greases.

Rolls of "Cellophane" cellulose film in the warehouse at the Bridgwater works of British Cellophane, Ltd.

Two packs embodying moisture-proof "Cellophane" developed by British Cellophane, Ltd.

"Cellophane" cellulose film is now extensively used for packing confectionery products.

As a protective coating and also for improving the appearance of the package, there is no doubt that "Cellophane" fulfils all requirements. It is now extensively used for wrapping confectionery, bakery products, fish and meat, and is generally accepted by the food industry as a simple and yet most effective means of preserving flavour, freshness and moisture, and yet at the same time improving the appetizing and sales appeal of the goods. Machines have been specially developed for wrapping automatically food products of all kinds. The wrapping material usually favoured for confectionery goods is heat-sealing, moisture-proof "Cellophane" cellulose film. All the seams of the packets are sealed by heat, the two ends also being crimped, thus giving added strength as well as a more attractive appearance to the bag. The elimination of adhesives is, of course, of inestimable advantage in packing any products which might be in danger of contamination, and also considerably simplifies the action of the machine. In the Baker Perkins range is a large number of mechanical robots, which find many applications for high-speed food packing with "Cellophane." Generous use is also made of "Cellophane" adhesive tape, which offers a simple and inexpensive method of sealing transparent packages.

This general survey of the part played by plastics in the food industry will, it is hoped, reveal the astonishing versatility of the materials now available, and possibly stimulate interest in the great potentialities of some of the more recent products of our industry.

PLASTICS FOR THE CRAFTSMAN

IN the past we have always stressed the fact that plastics are materials specially adapted to mass-production methods in a heated press and generally unsuitable for individual craftsmanship, although, of course, an increasing number of handicraft workers are now producing lovely carved objects from Perspex, the cast resins and cellulose acetate.

We are constantly being asked by readers for a plastic they can mould themselves in a cheap and easily made mould of plaster of paris. Up to the present there are few such materials, although the need has been steadily growing. The industry stands to gain considerably by the influx of new ideas from the craftsman, as distinct from the industrial designer. What is really needed is an adaptable material, which, like wood, can be handled on mass-production lines or easily carved to produce individual works of art.

Recent developments in America now promise to stimulate interest in what might be called plastic handicrafts, because of the availability of two new materials, one of which can be used for the production of the finished shape and the other for the forming of the mould. A material known as Shellflex, which is a cellulose acetate base compounded with special ingredients to make it water-resistant, can, according to *Modern Plastics*, January, 1939, be moulded in plaster moulds without heat or pressure. Lenart Impart, Ltd., are responsible for the pioneer experiments, and they are now producing colourful, lustrous vases and bowls in lovely iridescent shades of magenta, amber, lavender, rose and other rich and delicate hues. The mouldings are slightly translucent and totally different from any made by mass-production methods. Although they are extremely flexible (two sides may be touched together quite easily), they hold their graceful shape indefinitely. At present bowls and vases, ranging in size from 4 ins. to 12 ins., are being moulded, and all of them are eminently suitable for use.

The other material is known as Korogel, a soft variety of Koroseal, made by the B. F. Goodrich Co., Akron, U.S.A., and is recommended as a mould material for casting plaster of paris, cement and concrete, artificial marble and almost any kind of synthetic stone. Korogel is not affected by water, and the common materials found in casting shops and moulds made from it do not require any sizing or other treatments between casts. It does not shrink or expand, and, if handled with reasonable care, over 1,000 casts may be taken from the same mould. Unlike rubber products, which have been often proposed for the same purpose, Korogel can be remelted and used over and over again.

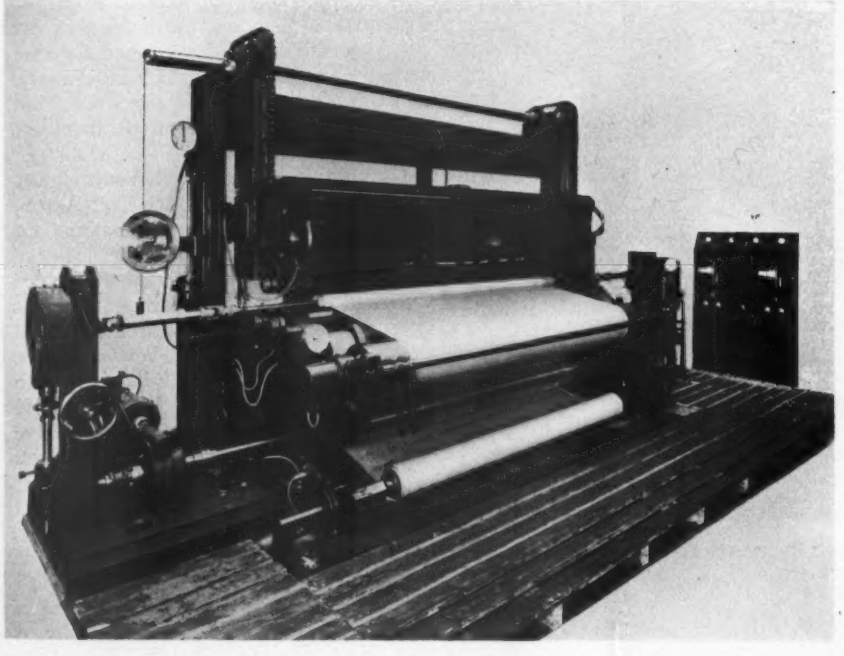
The new material can be used with the utmost simplicity. All that is necessary is to melt the Korogel, and then when sufficiently liquid to pour easily, it is poured slowly into the space allotted to it and allowed to cool. The model is then removed and the mould ready for use. Models of wood, metal, glass and almost any other rigid material, which is not affected by temperatures of approximately 275 degrees F., can be used.

There is a growing need to-day for an improved form of casting material, preferably one incorporating some plastic substance which will give added strength and a finer finish to the completed work. Experiments might usefully be undertaken by mixing plaster of paris with a half-polymerized syrup, made from urea and formaldehyde, and then completing the curing of the model by a short baking in an oven. Another likely process would be to develop a material composed of fine sand, or other filler, and a synthetic resin, which could be finally cured by chemical means. We should like to see a material of this type which could be sculptured and then hardened off afterwards by some suitable means. Judging from the many inquiries we have received such a composition would enjoy a ready sale.

New Development in the Manufacture of ELECTRICAL INSULATORS

THE use of plastic resin impregnated paper is finding an increasing use in the electrical industry. To cope with the new demand for high-voltage impregnated paper bushing insulators, the Bushing Co., Ltd., of Hebburn-on-Tyne, have installed a new machine specially designed and built for the work. It embodies all the improvements and refinements which experience has shown to be desirable, and in addition, being considerably larger than existing machinery, it will extend the range of the Bushing Co.'s products, and enable them to manufacture insulators of greater length and diameter than hitherto.

The heating rollers of the machine are 3 m. long and are electrically heated, the temperature being thermostatically controlled within plus or minus 5 degrees C. The temperature control, which is a most important factor in successful manufacture, is by Hartmenn and Braun, and consists of indicating instruments operated by a thermo-couple embedded in the wall of the heating roller; the instruments check the temperature of each roller every 30 seconds, and the current is switched on or off by contactors controlled by mercury switches within the instrument. Arrangements are made for the continuous indication of the diameter of the winding, so that accurate positioning of equipotential layers within the insulator is facilitated; continuous indication of paper tension, winding speed and total pressure is also given. The machine is very rigidly constructed and is fully automatic, the mechanical movements necessary being operated through hydraulic servo mechanism. The new plant is capable of winding insulators up to a maximum diameter of 300 mm., and represents a notable advance in the design of impregnated paper insulating winding machines, as it enables a more detailed control to be obtained of the winding process.



The new machine for the winding of high voltage Bakelized paper bushing insulators in use at the works of the Bushing Company, Ltd., Hebburn-on-Tyne.

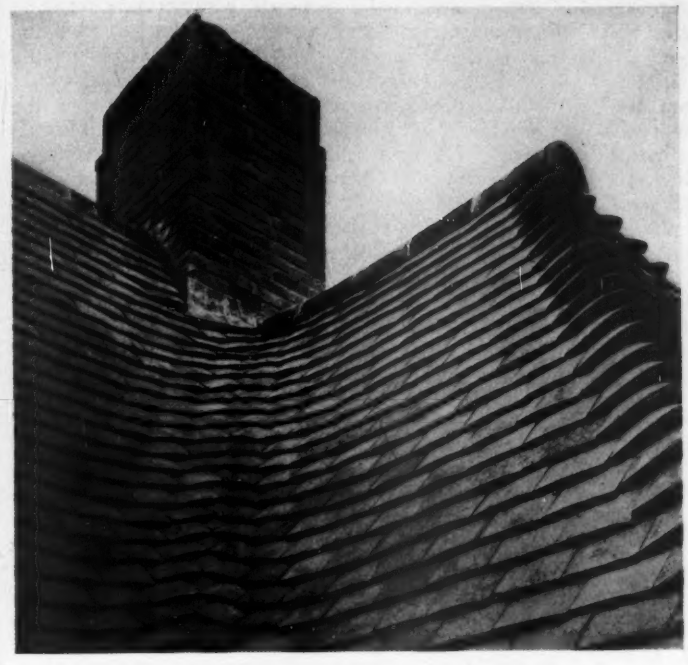
Laminated Leather for Upholstery

In the American trade journal *Hide and Leather*, January 5, particulars are given of a new process of leather lamination which, it is claimed, offers a solution to the problem of wrinkling and sagging of leather used for upholstery purposes. The inventor is Sterling B. McDonald, Chicago; designer, colourist and engineer.

Before being introduced, practical and laboratory tests of the processed leather were made by the U.S. Testing Co. laboratory and others, and it is reported that by this new support the tensile strength of leather is bettered by 35 per cent. and the stretch reduced 50 per cent.

The laminated leather has been subjected to thousands of flexings at body temperature, placed inactive upon a radiator in full steam for several days, then flexed, without affecting the bond or pliability of the leather according to the report.

A liquid bond, consisting of a specially compounded plastic base, is used to laminate a special fabric to the unfinished side of the leather. The cost is said to approximate two cents a foot and this cost may be reduced if necessary by using a thinner leather than would ordinarily be satisfactory. The method of application is simple, requiring no special tools or oven treatment, and the lamination may be applied by the tanner or upholsterer, allowing a few hours to dry. Top grain, machine buff, or deep buff in any finish may be used and an improvement in machine sewing is reported as the thread does not have a tendency to tear the leather.



MOULDED ROOF TILES

Are They Practical?

By D. A. DEARLE

Mr. Dearle, who is Manager of the Plastics Division for North and Judd Manufacturing Co., New Britain, Connecticut, writes :— "Ever since reading about the subject in one of your editions a short while ago, I have been anxious to investigate the possibilities of a moulded roof shingle and the facts, I thought, might be of some interest to your readers."

THE perceptible inroads now being made by plastics in the building industry have given rise to much speculation concerning the ultimate possibilities to be expected. It is generally conceded that the next great theatre of plastics activity will shift to this vast and fertile field of construction and even conservative prognosticators assert that such expansion is very close at hand. Perhaps the greatest visible impetus being given to this movement is to be found in the agitation prevailing at the present time for plastic tiles to replace the slate roofs used so extensively, and if the moulding industry is going to make a serious bid for recognition in the construction field, it is apparent that one of the most logical components of the modern residence is that of the roof.

Houses to-day are covered with innumerable different materials, both natural and synthetic, but, regardless of their composition, they all fulfil the same purpose, namely, protection from the elements. Wood or asphalt shingles are to be seen on the cheaper houses, while slate and tile appear on the more expensive types. Unquestionably, a roof made from either a phenol-formaldehyde compound, or even a transparent polystyrene, would be unique, to say the least, and, were it practical, such protection would indeed lend distinction to the complete ensemble. Before engendering too much enthusiasm about the possibilities, however, some serious thought should be given to the characteristics of competitive materials.

In the roofer's terminology the area of a roof is usually measured by the number of squares it contains. A square is nothing more than 100 sq. ft. of roof area, regardless of the irregularities such as valleys, dormers, ridges, hips, etc. Due to the lap of one shingle over another, however, the summation area of the shingles used on a sloping roof is always far in excess of the total roof area. Overlaps vary in accordance with sizes and specifications, but are always necessary to insure all-weather protection to the underlying structure. Hence it can be seen that the number of shingles required to cover a roof with dimensions of 10 ft. by 10 ft. will not be an even hundred units of 12-in. squares, but, instead, about 267 shingles when a 3-in. overlap is used. The same conditions would have to hold true if plastic rectangles were substituted.

Slate is perhaps the most durable material now used on sloping roofs, and inasmuch as a slate roof is a comparatively expensive type, we shall use it as an example in considering the possibility of substituting plastic moulded shingles. In the first place, it must be kept in mind that slate shingles are furnished in all different sizes, thicknesses, and colours, and the dimensions vary anywhere from 10 ins. by 6 ins. to 24 ins. by 14 ins., with approximately 30 intermediate sizes. Thicknesses on any of these sizes start at $\frac{1}{16}$ in. and increase up to 2 ins. or over, depending on the specifications. In addition to this, there is a colour range, which includes various shades of green, purple, grey, black, and red, as well as the numerous mottled colours. So it can be readily seen that the architect has sufficient latitude to prepare an almost infinite number of colour, size and thickness combinations. To duplicate these with plastic rectangles would require a great number of moulds.

Slate is applied to the roof sheathing by means of special nails, hence holes have to be punched in each shingle either at the quarry or on the job. It would be comparatively easy to accomplish this were plastic shingles to be moulded by merely incorporating pins of the proper size in the die. Furthermore, there would be no need to punch out the holes if they were subsequently going to be used for nails, so this finishing operation would not be necessary.

In supplying slate for the average roof, the quarrier charges less for the smaller sizes than he does for the larger ones. This practice appears to be inconsistent when consideration is given to the fact that many more of the small ones are required to each square. The lower price, however, is due to the process of manufacture, for, in making the larger pieces, the 10-in. and 12-in. lengths very often become a waste product, and hence the cost of them is substantially reduced. Such

reasoning would not hold true with a moulded shingle, however, for the price of the roof would be higher in proportion to the additional pieces required.

On the assumption that a black phenolic plastic shingle were practical, let us now look at the comparative cost situation. At the present time the cheapest type of unfading slate costs approximately £2 a square for the material at the quarry. This figure is based on 16-in. lengths by 9-in. widths and a minimum thickness of $\frac{3}{16}$ in. With these sizes, approximately 250 pieces would be required to fill one square, and, therefore, the price per thousand would amount to £8. If we now consider the cost of duplicating this particular size in a plastic rectangle of the very cheapest type of black material, we might figure conservatively as follows:—

		£	s.	d.
Material				
16″ × 9″ × $\frac{3}{16}$″ = 27 cu. in.				
27″ × .05 = 1,350 lb. per 1,000 net				
1,350 + 10% = 1,485 lb. gross				
	1,485 × 6d. =	37	2	6
Press Labour				
5 cav. 2½ min. cycles = 120 pcs. per hr. = 8 hrs. per 1,000 @ 2/5 per hr.	=	0	19	4
Finishing Labour				
Trim, inspect and pack 250 per hr. = 4 hrs. per M. @ 1/5 per hr.	=	0	5	8
Total labour	=	1	5	0
Overhead @ 150%	=	1	17	6
Total material, labour and overhead	=	40	5	0
5% rejections	=	2	0	3
Manufacturing cost	=	42	5	3
Sales, administrative, etc. @ 25%	=	10	11	4
Selling price at factory	=	52	16	7
Price per square	=	£13	4	2

From the above figures, it becomes evident that a wide divergence exists between the estimated cost of plastic shingles and that of slate. At first glance it might appear futile to even consider the substitution of a moulded shingle for the present material, but further analysis will disclose a few interesting points.

In the first place, it will be noted that the cost of material alone is almost 12 times that of the combined labour and overhead. This fact in itself immediately points out where the reduction must first be attempted. Secondly, the matter of comparative weights has not entered into the calculations, and in this respect it should be remembered that the specific gravity of slate is approximately twice that of the average plastic material. Freight or trucking charges in shipping slate become quite a factor in the delivery of this material and quite a saving made were the weight reduced.

Inasmuch as the reduction in material price is essential, it is imperative that this element of cost be approached first. There are actually only two ways of reducing this figure. One is by decreasing the unit volume and the other by substantially cutting the raw material price. In the foregoing estimate the volume was based on a rectangle 16 ins. long by 9 ins. wide and $\frac{3}{16}$ in. thick. These dimensions would, of course, produce a fairly solid piece and undoubtedly certain sections could be eliminated without seriously jeopardizing its strength or utility. Due to the fact that any reduction in length or width would necessitate the use of more parts, such economy would defeat its own purpose. Hence the thickness dimension is the only one that can be scrutinized with a view towards economy.

Fig. 1 illustrates a rectangle with sections removed from the under side in such a way as to retain the appearance of a $\frac{3}{16}$-in. thickness and yet reduce the weight by almost 50 per cent. The outer edges would maintain the full thickness, but the major part of the under side would be dispensed with to give a reduced section. The cross rib as shown would not only tend to give the piece strength, but also make it practical for the application of nails to the roof sheathing. If necessary, an additional rib of smaller cross-section could be added in the longitudinal direction without seriously affecting the total weight. At any rate, by constructing a rectangle in this manner, the cost of the material would immediately be cut in half and, in referring once more to the hypothetical estimate, it will be noted that the reduction of material cost by 50 per cent. would amount to £18 per thousand. If this figure is carried through to the selling price an even greater saving will be realized. The cost of such a part would still be almost three-and-a-half times that of the competitive slate, however, and this difference is too great to make any substitution practical.

About the only remaining possibility of further economy would be in the direction of reducing the price of the material itself. A figure of 6d. a pound was assumed in the estimate, but what would be the outcome if the powder were to be figured at half that price? The gross weight of 742 lb. at 3d. a lb. would give a total material cost of £9 5s. 6d. If this price is carried through in the estimate to the cost per square, a selling figure of less than £4 a square is obtained. This would now come within reason of the prevailing price of unfading slate. Due to the much lighter weight of a moulded shingle, further savings would be enjoyed in the shipping costs and also the subsequent laying of the roof would be more economical.

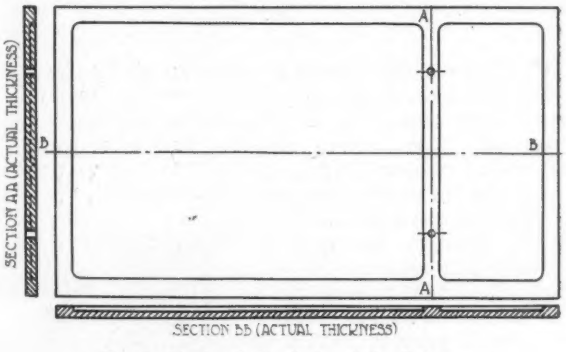


Fig. 1.—Form of tile designed for lightness.

To recapitulate, then, it is apparent that one very serious obstacle lies in the path of placing plastics on a competitive price basis with the more expensive roofing materials. The sole barrier, from a cost standpoint, seems to be that of producing a moulding powder within the price range of 2½d. to 3d. a lb., but even if the price factor could ever be met, the resultant material would have to contain a moisture-proof resin as its binder. Polystyrene would perhaps be the most practical compound for this purpose, due to its low water absorption and high heat-distortion temperature. Of course, the moulder's ultimate aim would be realized if a practical transparent compound could be manufactured at a reasonably low cost, but no such introduction appears in the offing. Consequently, it must be concluded, perhaps somewhat reluctantly, that the moulded roof shingle is not yet a practical application.

HIGH SPOTS OF 1938

By the Editor

A short résumé of some of the noteworthy advances that have taken place in the plastics industry during the past year

AT this time of intense industrial exposition at Olympia and in Birmingham it might prove interesting, and to some extent useful, to see in retrospect what may generally be called the most important happenings in the plastics industry during the past year.

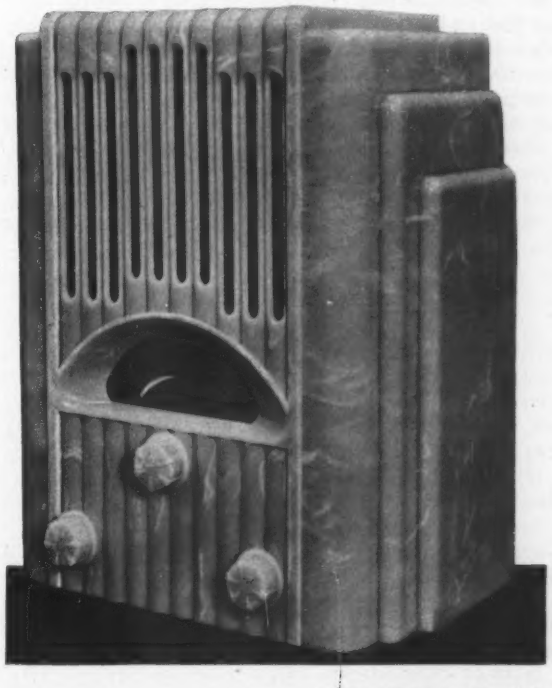
It is often dangerous to describe what the best or most useful productions have been, for one man's meat is often another's poison. We are all biased, I presume, and we certainly cannot have the same views of what a real advance consists. In general, I think readers will agree that, although we may have missed equally good or better instances, those that are mentioned deserve praise. As for artistic merit, we shall avoid such reference, except in so far as it may affect the industry as a whole.

Phenol and Urea and the Moulding Industry

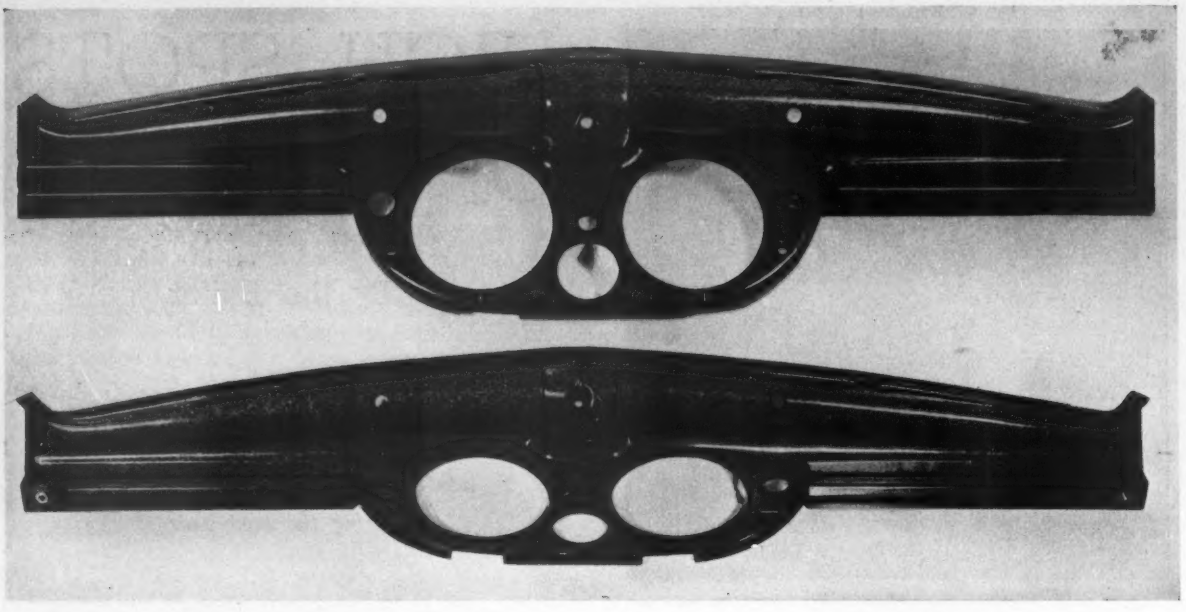
The past year was noteworthy for many advances, not only in the actual technique of moulding, but also in fresh ideas or in new attempts of economic importance. Increase of size to those outside the industry may appear to have little merit, but the technique of moulding is not as simple as metal pressing, and the production of "larger than ever" moulded goods is a definite advance, especially since such work opens up fields hitherto untouched by synthetic resins.

However, were I asked, "What is the most important advance that has been made in moulding in 1938?" I should plump for the work of British Artid Plastics, Ltd., a résumé of which we gave in our October, 1938, issue. Many, I feel sure, will disagree with me because its applications are not for the heavy side of our industry, which is probably its most important side economically. Neither does one know how far it will be employed, for the factory has only recently been erected. My reasons for choosing it are that it brings a new method of pictorial representation on plastics, transcending by far any other method hitherto employed, giving a beauty to the finished goods that was truthfully quite impossible before. My main reason is that, because of the foregoing one, the process opens up possibilities of plastics entering other industries, decorative, display and so on, where, admittedly, plastics have been received to a limited extent only. The example we give above again of a Bible covered with what appears to be ivory deeply "etched," but, in fact, moulded with a religious picture, both imperishable, amply portrays what I mean.

Another advance, in an entirely different category, I mention because of my admiration for a courageous attempt to upset wrongly conceived theories and practices of the radio industry. This industry—or, rather, its retailers—imprudently presumes to know the public taste, and in the past has insisted that the public only wants wooden cabinets. A falser conjecture was never



A beautiful example of the new radio cabinets that have been made by British Industrial Plastics, Ltd.



The new facia-board that was manufactured for the 1939 Sunbeam-Talbot.

made, and British Industrial Plastics, Ltd., have constructed a series of cabinets entirely in plastics, with a beautiful range of light colours, which we sincerely hope will confound the critics. Lovely cabinets in plastics go down very well in the United States and elsewhere, as we have often shown, and there is no reason why they should not be accepted in this country.

When we come to advances, from the point of view of largeness of moulding, the palm must go to those moulders who cater for the motor industry, such as H. E. Ashdown and Thomas de la Rue. Here the entry of plastics has gone no farther, as yet, than the production of facia-boards and window frames (apart, of course, from the hundred and one smaller gadgets), and we believe the first-named firm was the first in the field in such production. The most interesting advance in 1938 was the building of an entire facia-board by Thomas de la Rue for the new Sunbeam-Talbot. From the point of colour, too, it had considerable merit, in that it was the first attempt to get away from the dismal browns and blacks so beloved of motorcar manufacturers. It is 3 ft. 3 ins. in length, weighs 3½ lb. and is an integral part of the body structure.

A one-piece moulded facia is also fitted on to the Hillman Minx, which Mr. H. Heath, of the Hillman Motor Car Co., Ltd., tells us is certainly the largest moulding on any British car. What is so important to our industry is that motorcar manufacturers are realizing the value of the inherent properties, chemical and physical, of synthetic resins, for, as the same gentleman has told us: "The improvement of internal finish, coupled with its practical nature, lightness and sound-insulating qualities, have been favourably commented on by the trade."

There is one note I should like to include here regarding raw materials. Research is continuous in all fields, and Bakelite, Ltd., have developed new phenolic moulding powders with outstanding electrical characteristics. Specially noteworthy is a new powder with very high "anti-track" properties and an impact strength ten times that of general-purpose powders. There is also another, designed expressly for high-frequency work. A Bakelite-polystyrene moulding material has also been developed, having an exceptionally low power factor, combined with very low water absorption.

As for interesting new uses, I must mention the water-softener container in Bakelite moulded by Insulators, Ltd., in which the phenol resin was admirably suited and an improvement on metal for resistance against corrosive salt. There was also the interesting development by the General Electric Co., Ltd., of moulded Beetle for electric fire surrounds, proving that plastics can be employed with advantage, if design is properly conceived.

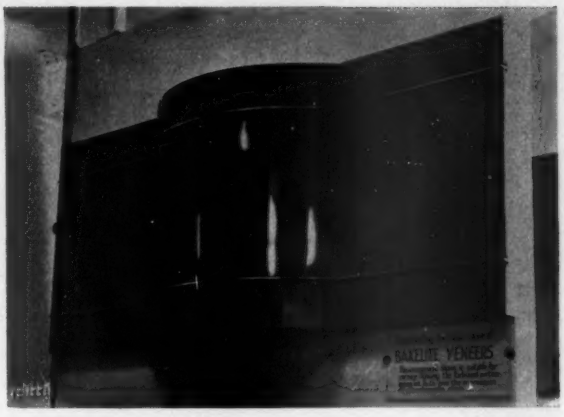
One of the most significant movements in moulding production has been the coming of the electric shaver. There must be nearly a dozen different types on the market, all streamlined, all very beautiful and seemingly very efficient, and all made of phenolic or urea-formaldehyde resin powders. For general purposes they are amazingly good, although I am rather chary of using one in my bath, which is where I get my best shave.

Impregnated Laminated Veneers, etc.

The number of manufacturers has increased during the last couple or years, and their work has come to light especially in 1938. Warerite, Ltd., is specializing in decorative material, and we look forward to many innovations by this firm, especially the introduction of embossed designs and the use of real tapestry duly impregnated to form the top layer. What this company is capable of is seen in a photograph we publish on another page dealing with the "Coronation Scot."

Bakelite, Ltd., who were pioneers of this type of material, showed a very arresting exhibit at the Building Exhibition in September of curved veneers, which admirably demonstrated the pliability of their material.

Jicwood and Aero Research, Ltd., of Duxford. Cambridgeshire, specialize, in the main, on the aircraft industry. During a recent visit to the first-named company's works at Weybridge we were privileged to see



These curved Bakelite veneers were shown at the Building Exhibition.

the fabrication of aeroplane screws, especially those of the variable-pitch type made from impregnated wood. The production has increased so greatly during the past year, owing to R.A.F. requirements, that the works have been considerably enlarged.

The work of Dr. N. A. de Bruyne, of Aero Research, Ltd., is perhaps little known to the general public, but his recent lecture before the Weybridge branch of the Royal Aeronautical Society shows how important it is. Aero Research, Ltd., can now produce a synthetic material with properties which were good enough for aircraft construction (that is, apart from air-screws), and which were in some respects, e.g., tensile strength, better than the materials normally employed. By the impregnation of fabrics, such as linen and eventual compression and curing in electrically heated presses, it is possible to construct 30-ft. "planks" for fabrication into, for example, aeroplane spars. Special methods of jointing, by a system of interlocking dowels, has been perfected.

Under this heading may be conveniently included materials of the type of Peton and Hyten marketed respectively by United Insulators, Ltd., and Hyro-Plastics, Ltd. Both are produced by somewhat analogous methods, namely, the impregnation of flock with resin emulsions, resulting, after pressing, in a sheet which can be moulded almost, although not quite as easily, as the well-known powders. A very strong material is produced which should find wide applications in the heavy industries.

Extrusion of Phenolic Resins

This rather difficult process of producing tubes, or rods, from synthetic thermo-setting resins, we first described in our June, 1937, issue. The most interesting development in this section is that of the Dap Manufacturing Co., who, utilizing Rockite resins, have now placed on the market a series of runways for the support of curtains. The runways can be obtained in a variety of cross-sections (see p. 333, October issue of this journal) and in a variety of colours. Particularly useful, too, is that the runways are also made curved for curved windows. Obviously, this process can be employed for making beadings and dadoes.

Cast Phenolic Resins

There is little to report in this field, except the important fact that Erinoid, Ltd., commenced in 1938 this manufacture on a large scale. Several of their customers have already produced some magnificent examples of artistic work by carving from this beautiful resin.

We should mention here the success of the other well-known cast-resin Catalin, which gave us what I called the high-spot of the 1938 Motor Show. Here Catalin was used for the first time in the construction of the facia-board and side windows. At the time I referred to the texture of this Catalin as being a "sublimated tortoiseshell," a term which I note Dr. Yarsley honoured us by repeating in his article in *The Times* Trade and Engineering Supplement of December, 1938.

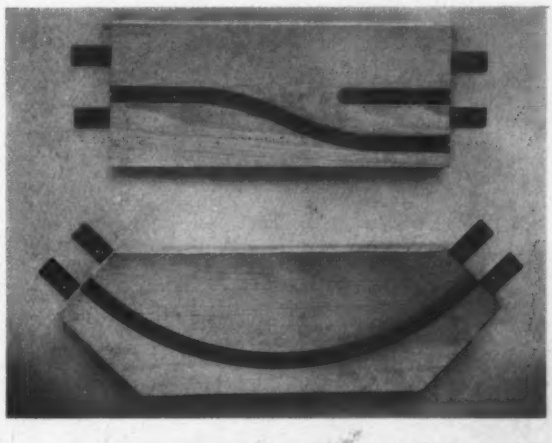
Of significance is the inclusion in the factory of London Moulders, Ltd., at Wembley, of a special section which deals with the fabrication of letterings, etc., from cast resin. London Moulders, Ltd., have hitherto carried out work with moulding powders only. The carrying out of both types of work under one roof is an interesting experiment.

Thermo Plastic Materials

There has developed, during the past year, an increasing use of these materials in all categories. Most widely used are the cellulose acetates, known under the trade names of Bexoid, Rhodoid, Celastoid, etc., especially now that their importance for aircraft and A.R.P. is so widely recognized. Windscreens, gun-turrets, windows, and so on, of acetate are employed in many aeroplanes, while for A.R.P. work this sheet has been advocated for protective purposes by the authorities. Special adaptations, with wire mesh interleaved, are also available. The Hope Window, made of Armourbex, is stated to withstand, unscathed, the equivalent of the bursting of a 150-lb. bomb 6 ft. away.

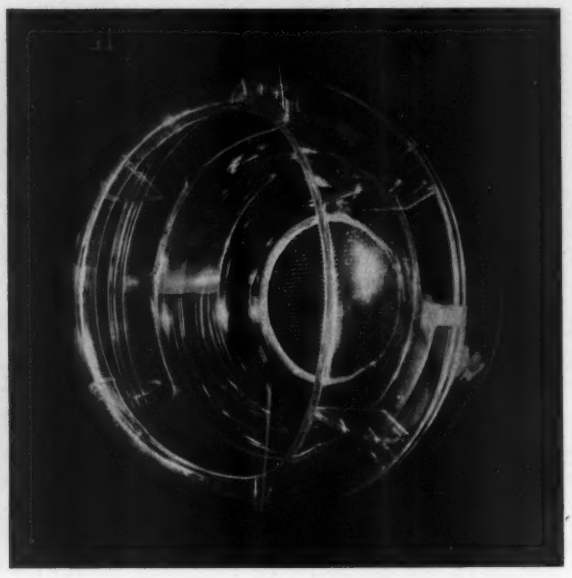
An interesting development, or rather an example of the modern technique of acetate shaping, was that which we included in our September issue. We refer to the transparent hair-drier of Celastoid, made for C. Nestlé and Co., Ltd., by Albert Optical Co., Ltd.

As for the injection moulding of cellulose acetate and other thermo-plastic compounds, the main feature is the spread of this process which is now becoming very wide indeed. Most of the large factories carry out this work, which is mostly of the small object type, such as combs, zip-fasteners, paste-tube lids, spectacle rims, etc. We saw some three of the famous Reed-Prentice machines, handled in this country by Alfred Herbert



Examples of extruded curtain railing by Dap Mfg. Co.

A beautiful figure carved from Erinoplas.

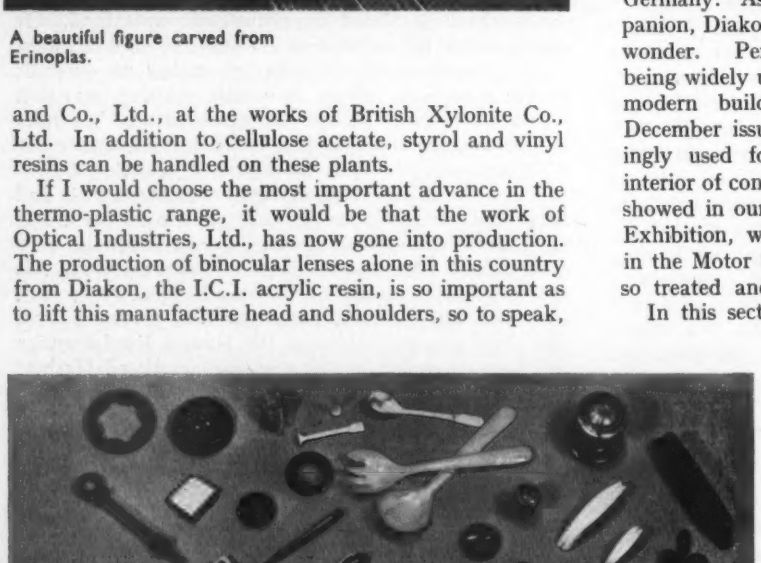


Transparent plastic hair drier fabricated from Celastoid sheet by Albert Optical Co., Ltd.

and Co., Ltd., at the works of British Xylonite Co., Ltd. In addition to cellulose acetate, styrol and vinyl resins can be handled on these plants.

If I would choose the most important advance in the thermo-plastic range, it would be that the work of Optical Industries, Ltd., has now gone into production. The production of binocular lenses alone in this country from Diakon, the I.C.I. acrylic resin, is so important as to lift this manufacture head and shoulders, so to speak, above any other in this field. That it is now possible to manufacture lenses on a mass-production scale from raw materials, made in this country entirely, is more important than most advances. Remember that most lenses for the Army and Navy in 1914 came from Germany. As for Perspex sheet and its moulding companion, Diakon, they always make me open-mouthed in wonder. Perspex, like other transparent sheets, is being widely used in aeroplane work. Of its entry into modern building, for lighting, we related in our December issue, p. 405. This material is also increasingly used for exhibition purposes for viewing the interior of constructions. Excellent examples of this we showed in our issue which dealt with the Ideal Home Exhibition, where an Ascot Heater was ghosted, and in the Motor Show, where the Hillman Minx was also so treated and created great interest.

In this section I must also mention something new for this country, namely, the extrusion in tube form of the vinyl type of resin for producing electrical cables. As far as we know, the only work being done here, on a reasonable scale, is by Hydro-Plastics, but as we have included a special article elsewhere in this issue I need refer to it only as one of the utmost importance to the whole of our big electrical industry.



The wide range of articles produced on the "Isoma" automatic injection moulding machine.

★

In last year's Annual Report of the Fuel Research Board it was explained that the dustproofing of coal has for its primary object the elimination of the nuisance which can arise during the handling of coal, and details were given of some of the first experiments carried out at the Fuel Research Station. In the latest report of the Board for the year ended March 31, 1938, details of the latest experiments are given. It has been found that, whilst the dustproofing of coal can be successfully carried out with oil preparations, certain difficulties are experienced in treating coals of less than about 83 per cent. carbon content (on the dry ash-free basis), which are rather porous and absorb the oil, so that before very long the coal again becomes dusty. The suggested importance of coal porosity leads to the idea of preventing the penetration of the dustproofing fluid by blocking the entrances to the pores. The most successful experiments carried out along these lines have shown that a mineral oil containing 1 per cent. to 2 per cent. of raw rubber or of a commercial substance of molecular weight 50,000 to 100,000 (understood to be an iso-butylene polymer) had a positive effect. It is not yet possible to give final results, but the first trials have shown that the amount of oil required to dustproof the low-rank coal was reduced and that the persistence of the effect was greatly increased. A considerable amount of interest in mining circles abroad has been created by the publication of these results.

★

Rubber is already finding increasing applications in the textile industries, and a recent patent taken out by British Celanese, Ltd., B.P. 494,466, describes an interesting new use for latex. Fabrics containing mixed staple-fibre yarns comprising 20 per cent. to 40 per cent. animal fibres and 60 per cent. to 80 per cent. fibres comprising cellulose acetate are treated with latex and the latex solids precipitated in or on the fabric. The animal fibres are preferably wool and the amount of latex solids precipitated is preferably 3 per cent. of the weight of the fabric. It is claimed that fabrics treated in this way have increased resistance to wear, laddering and creasing. This patent is one of several recently taken out to protect new uses of latex in the textile industry. They clearly show that rubber is becoming of importance to this industry.

★

According to the *Hardware Trade Journal*, January 13, 1939, a new rubber-covered clothes line has recently been placed on the market by Samuel Mercer and Co., Albion House, 4, Queen Street Place, London, E.C.4. A number of advantages is claimed for this new type of line, which will be available in a variety of colours to ensure popular appeal. It is strong and flexible, having a copper-wire core, and can be wiped clean with a damp cloth. It is quickly tied by a simple hitch which will not slip and it cannot injure the most delicate fabric.

★

A recent patent, B.P. 495,263, describes a method of using synthetic rubber for bonding leather surfaces together. Aqueous dispersions of chloroprene, such as Neoprene latex, are freed from malodorant matter by agitating with light petroleum spirit or similar material. Adhesive compositions for bonding leather surfaces together comprise a chloroprene latex treated as described above, preferably with the addition of a wetting agent, such as soap, or fatty alcohol sulphate. In forming the bond, for instance, for attaching a sole to a shoe upper or cementing a channel flap to the base, the two surfaces are coated with the adhesive and while the coatings are still wet they are pressed together, for instance, in a special press.

★

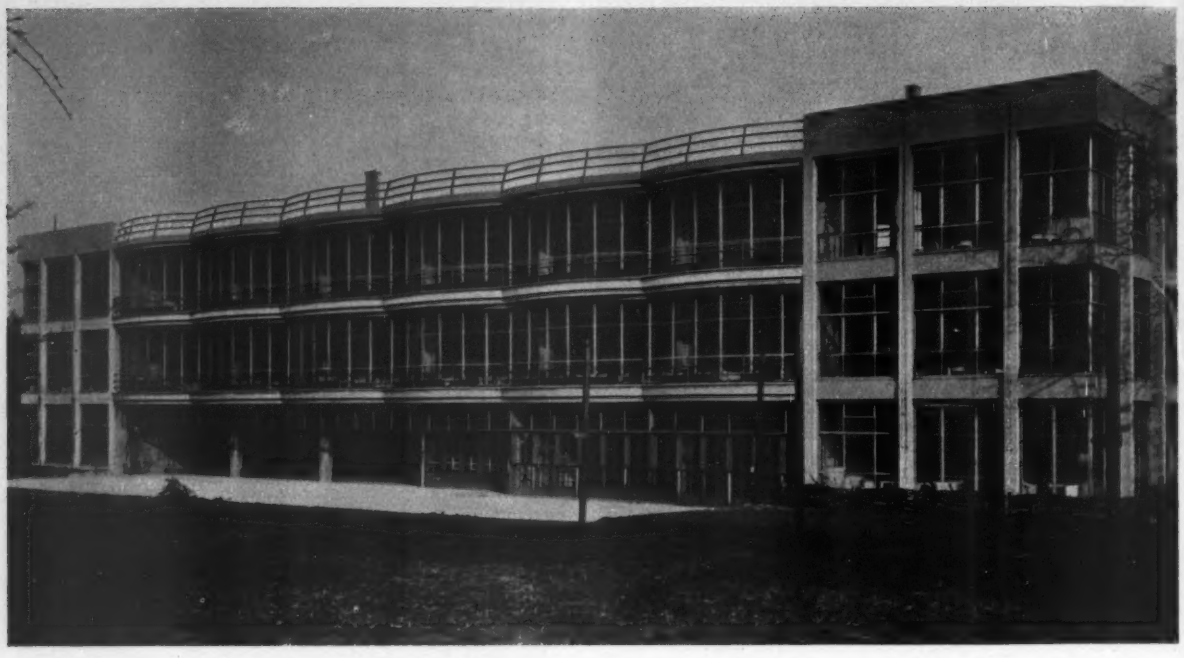
The United Dairies are to be congratulated for their enterprise in experimenting with rubber horseshoes. According to the *Sunday Times*, January 15, the company made a beginning with a single animal and have now extended the use of rubber shoes until at present nine depots, representing some 500 delivery-van horses, are shod entirely with rubber. In districts where iron horseshoes have been replaced by rubber complaints of disturbance which used to reach the company with monotonous regularity have disappeared. Mr. F. W. Frith, who supervises five of the United Dairies horse depots in the south-western quarter, told a reporter of the *Sunday Times* that no injury has resulted from the adoption of rubber shoes.

★

A new latex adhesive paste has just been put on the market which, it is claimed, combines the advantages of many different adhesives. The adhesive is strong, waterproof and non-wrinkling, and it has the advantage that it gives good adhesion on a wide variety of surfaces, including varnished surfaces, plastics and metals. Owing to the fact that surplus can be so easily rubbed off, it can be applied if necessary without a brush or spreader. A further advantage claimed for the paste is that it is more resistant to the risk of drying up in the tube or jar than most other adhesives.

★

Rubber yarns are becoming of considerable importance to the textile industry as the types of thread available are increased to meet the varied requirements of industry. According to the *Rubber Age*, January, 1939, square-cut rubber threads are now available wound in hanks of 500 yds., with 1/100-in. end section, a new method of cutting having been devised to give greater integral length than was formerly possible. When the square-cut thread is covered, it is said that the covering strands bite well into the corners of the core thread and give considerable stability to the yarn covering.

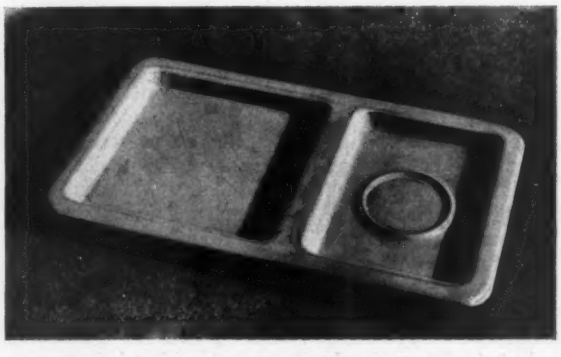


A Centre for Health Needs Plastics

HEALTH and fitness are very much in the public mind just now and it is, therefore, particularly interesting to consider the part played, and also the opportunity which exists for plastic goods in one of the most progressive and modern health centres in the world. The Pioneer Health Centre, Peckham, was opened in May, 1935, as a club for families in the neighbourhood where health overhauls by the medical staff are given regularly about once a year to all members. It costs a shilling a week per family to belong to the Centre and this subscription covers full membership of the club, the periodical medical examinations, use of all the club apparatus, such as the swimming bath, gymnasium and access to a supervised nursery for children under five. In addition, there is a well-equipped cafeteria and various club rooms, where all kinds of indoor games may be played. Only those who have watched whole families at play can appreciate what a godsend the Centre is to many hundreds of tired parents who for years have been starved of real community life in a drab and congested area of London.

When the Centre was being equipped, Dr. G. Scott Williamson, who has always been enthusiastic about plastics, looked around for suitable plastic materials which he hoped to be able to use instead of metal. In an interview he admitted that his enthusiasm for the new materials was not always tempered with an adequate knowledge of their properties. One of his first steps was to provide the Centre with moulded trays for use in the cafeteria. These were moulded of an ivory coloured material, origin unknown, and looked most attractive, but after a few weeks they had to be discarded, owing to heavy breakages and staining. It should be mentioned that these moulded trays were expected to stand up to the action of a washing machine, in which a fairly strong alkaline scouring liquor was employed. Anodized aluminium trays are now being used and these apparently give every satisfaction, although it is admitted that coloured moulded ones would look a good deal better. An alternative to the latter would be to employ coloured anodized aluminium utensils which had been treated with Lithcote, the new plastic coating material.

Choice of laminated veneers for covering the counter of the cafeteria has fortunately turned out quite satisfactory and Dr. Williamson would like to see all the tables in the centre covered with the same material. Apparently the only obstacle to this excellent plan is



The anodized aluminium tray mentioned in the article. Trays of this pattern were originally moulded.

the relatively high cost of the plastic covering, as against the linoleum-like material now used.

There are many opportunities for plastics at the New Health Centre and the directors are always examining the claims of new materials and doing their best to persuade manufacturers to take a live interest in the equipment used on the premises. Dr. Scott Williamson is at present considering the advisability of replacing the plate glass screen, which separates the café or lounge from the swimming pool, with one made up of panels of a suitable plastic material, such as Perspex or cellulose acetate. Apparently the glass panels are smashed occasionally by bathers sky-larking and the splinters constitute a considerable danger, not only to other bathers, but also to spectators in the café. There is no doubt that Perspex or cellulose acetate would fulfil all requirements and ensure complete freedom from accidents.

The Centre offers a fine testing ground for plastic goods and we should imagine that many firms would welcome the opportunity to contribute to the modern equipment of this unique establishment, and at the same time obtain very valuable data as to the practicability of their materials under really strenuous conditions of wear. At present the Centre is heavily in debt and it would be impossible for the medical directors to instal more equipment. This, however, should not prevent the plastics industry from making a generous gesture. In medical circles the Centre is said to be a biological laboratory in search of raw material. There is no reason why it should not also be a real testing laboratory for plastic goods.

"IN THE WATER UNDER THE EARTH"

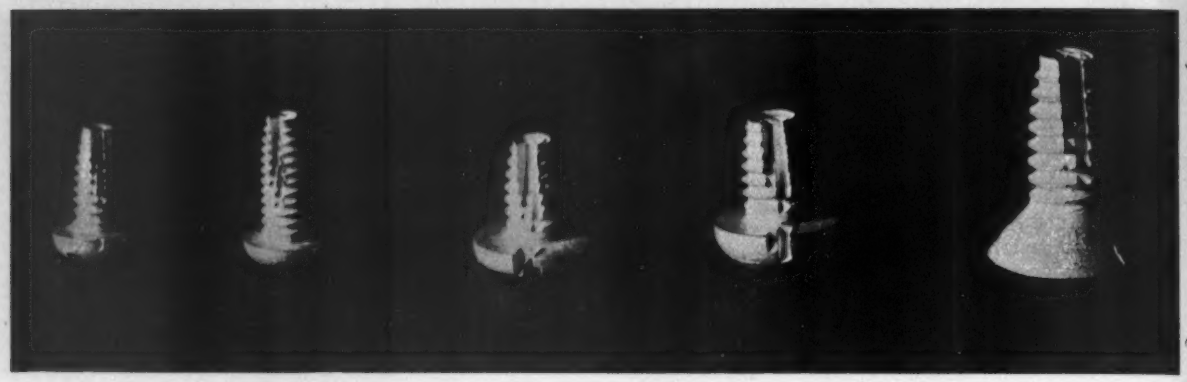
"THIS, ladies and gentlemen, is a shark. He is about to gobble up the poor, unsuspecting haddock on his right." No, this is not a "barker" standing beside a tank of water at the local fair, explaining the wonders of the deep. The picture is a real photograph taken on the sea bottom near the Bahama Islands, and is a reminder of the existence of so much beauty that hitherto has been hidden from us, and which we have a good chance of seeing, thanks to modern ingenuity, in the future.

The bottom of the sea, its flora and fauna, have been a source of intense interest to most of us ever since, we suppose, we first opened the pages of Jules Verne's "Twenty Thousand Leagues Under the Sea" and voyaged with Captain Nemo, treading the dark, mysterious submarine forests and seeing the horrifying fight with the giant squid. There is, however, more than sensational interest in examining and watching the life under the seas. It is of extremely high scientific value.

Underwater photography is increasingly practised now, but, naturally enough, the districts are limited to waters of extreme clarity, such as exist on the east coast of America, e.g., Florida, West Indies, the Gulf of Mexico and the South Sea Islands of the Pacific. Much of the photography has been taken by divers in their special suits and with specially protected cameras, but tanks have also been devised, so that freedom of movement is greater. Such tanks must, at certain points, be transparent, and it would seem that windows constructed of acrylic resins typified by Perspex, Lucite and Plexiglass, which are much more transparent to light than glass and more resistant to shock than glass, are admirably suited for the purpose. Cellulose-acetate sheet, although not so transparent, would also prove much more suitable than glass, as a note below clearly shows. It is obviously within the bounds of possibility that an entirely enclosed compartment, say, 6 ft. cube and wholly transparent, will one day be available for undersea observations.

The use of transparent plastic sheet for examining the sea bottom from the surface has been brought to our notice by Mr. Watson, of May and Baker, Ltd., who tells us that transparent Rhodoid, 6 mm. thick, was selected by John I. Thornycroft, of Woolston, after a series of tests, for fitting in the bottom of a special fishing and observation dinghy to be used by the Duke of Sutherland, who is cruising to the South Seas in his motor yacht "Sans Peur."

Another novel use of plastics has recently come to light at an exhibition of underwater drawings at the Stafford Gallery in London. They had been drawn under the sea, again in tropical climates, to illustrate fish life. The artist, Mr. Gibbings, of Reading University, uses a sheet of Xylonite, the well-known cellulose-nitrate plastic made by British Xylonite, Ltd., drawing with a stick of graphite enclosed in rubber tubing for a pencil. The work was carried out in the conventional diving suit.



SCREWS FOR PLASTICS

CONSIDERABLE progress has, during the past five years or so, been made in the manipulation of plastic materials, particularly laminated sheets, and one of the most interesting and useful developments has been the perfection of screws specially designed and made for plastic materials.

One of the best known of these new screws is the Shakeproof Hi-Hook thread-cutting screws manufactured by Barber and Coleman, Ltd., Brooklands, Manchester. A clean, sharp thread is obtained in any plastic material, because the double-slot design of the Hi-Hook screw assures an acute cutting edge, which drives easily, cleanly and without fracture of the material. The fastening is tight and rigid, and should replacement ever be necessary a standard machine screw of the same thread can be used. Of considerable interest to engineers, shopfitters, plumbers and other types of workers likely to make use of plastic materials, is the fact that the use of these thread-cutting screws reduces costs and speeds up production by eliminating the cost of taps and the troublesome tapping operation.

The Shakeproof Hi-Hook screws are essentially of the standard Shakeproof thread-cutting design, except for the fact that the cutting edge of the screw proper has been shifted, resulting in a more acute edge. This characteristic is of particular advantage in cutting threads in such materials as Bakelite and similar plastic materials. The acute edge complies with the principle conventionally used in the design of cutting tools, which reduces the effort to a minimum when used in various materials. Consequently the principle applied to the Shakeproof thread-cutting screws has been proven of considerable advantage, particularly in the fact that the driving torque for the Hi-Hook screws in such materials has been reduced to compare with the driving torque of the standard Shakeproof screw when used in metals.

The following driving and holding tests of Shakeproof Hi-Hook thread-cutting screws in paper base Bakelite of various thicknesses afford striking proof that in performance they give considerably better results than ordinary machine screws and are very simple for even inexperienced workers to use.

HOLE SPECIFICATION					ENGINEERING DATA			
Screw size	Material thickness	Number of sheets	HOLE SIZE		% Thread engagement, actual	Peak driving torque, inch lb.	Ultimate strip torque, inch lb.	Ultimate holding load, lb.
			Drill #	Diameter, inches				
Shakeproof								
6-32	3/16	1	32	.116	48.7	7	21.5	1,362
8-32	3/16	1	28	.140	51.1	12	50	1,600
10-32	1/4	1	19	.166	51.2	15	70	1,816
1/4-20	1/4	1	3	.213	50.7	30	130	2,860
Machine Screws								
6-40	3/16	1	33	.113	67		18	760
8-36	3/16	1	29	.136	70.6		33	1,150
10-32	1/4	1	21	.159	68.3		52	1,380
14-24	1/4	1	6	.204	60.3		97	2,480
1/4-20	1/4	1	7	.201	69.2		110	2,520

CELLULOID FOR CANCER RESEARCH

The recently published report of the Medical Research Council on experiments in the use of radium for the treatment of cancer, mentions the fact that celluloid has and is playing an important part in the work carried out at the London Radium Institute. In order to determine the optimum dose of radium emanations necessary in different cases, it was found possible to make use of what might be regularly called a "celluloid man." This is really a life-size model of a man constructed entirely of celluloid sheet material. With this interesting model, work is now being carried out to determine the effect of various doses of the radium rays and also measure these doses with accuracy and speed. We should imagine that celluloid or cellulose acetate would also be useful for making anatomical models.

Ideas—

By the EDITOR

Your Change!

Many are the devices and methods employed by our friends the advertisement fiends for attracting the attention of the public to well-known goods; one of the commonest in druggists' shops is that of delivering your change on a solid glass disc suitably inscribed with a manufacturer's name. The accompanying photograph shows what can be done in a modern way, utilizing a plastic moulding. Here

Prestware, Ltd., have moulded the change receptacle, for the Vick products, entirely of one piece and so made that sample packets of the various preparations are safely housed therein. And you're told the time, too! Presumably that it's time you bought a packet of Vick lozenges with the change you've just received.

Pistons of Plastics

While chatting some time ago with a well-known engineer and plastics expert, he informed me that some research was being carried out on producing pistons made from synthetic resins for internal-combustion engines. The idea seemed so revolutionary that I asked how such a piston could stand up to the heat, or, alternatively, whether it was possible to carry away the heat sufficiently quickly by means of metal piston rings from a material that is virtually a non-conductor. The reply, of course, was that these problems were the object of the research. These thoughts came into my head when looking at a new patent (No. 494,397) that has been granted to the Pyrene Co., Ltd., and which shows, once again, the importance of regarding plastics as a material of construction against chemical attack. The patent in question deals with the production of a piston in synthetic resins. Presumably this is for the Pyrene fire extinguishers, containing a non-inflammable liquid which is squirted on to the source of fire by the pumping action. The liquid used for this type is a chlorinated organic material, such as carbon tetrachloride, and I presume the piston is normally a metal one—at least, in part. These chlorinated bodies are, under certain conditions, liable to slight decomposition, with resultant evolution of hydrochloric acid, which may attack the metal and rust it. This may be the reason for the adoption of the synthetic resin piston, and a good reason it is, too, for acid could not attack the material.

Plastics Up the Chimney

I have received from Mr. Charles H. Butcher, who is well known in chemical-engineering circles, a letter which, while at first sight may seem amusing, yet contains a suggestion which is extremely interesting. I did not know that the guards he speaks of are used to any great extent, and, in fact, must plead ignorance of them. However, here is the letter:—

"Safety, attained by the use of plastic materials within the home, in the form of the simple plastic switch and fuse covers and lamp fittings, is obviously appreciated by the general householder. But it is also necessary to draw attention to the desirability of safety measures applied externally to the house. Usually the necessity for such measures is not obvious.

"Most householders are aware of the inconvenience which is caused by sparrows and starlings getting access to chimneys. Quite apart from the partial blocking-up of the upper chimney space by nests, there is extra inconvenience arising from birds which accidentally fall down the chimney, and in recovering dislodge a considerable amount of loose mortar and adhering soot, which then falls down the chimney and spreads upon the hearth. This usually happens in the early hours of the morning, it being common for the birds to seek breakfast rather earlier than the average householder. In desperation the annual chimney sweeping is followed by a visit to the local builder, who is instructed to fit a wire guard over the chimney to prevent further trouble.

"These chimney guards are made normally of metal wire, duly galvanized to give protection from the weather. Fixed on the chimney well above the roof, such a device is in a suitable position to attract lightning during a thunderstorm, and as there is no direct "earthing" electrically, as for a proper lightning conductor, the presence of the metal guard may easily be a source of danger. Circumstances have already pointed this out, for in more than one instance within the past year it has been found that, where houses in London had been struck by lightning and had suffered considerable damage, there were guards fitted over the chimney openings; indeed, in one particular case which came to notice there was a choice of more than one chimney stack upon which the lightning could have made its presence felt, but it was the stack where a chimney was fitted with a galvanized-wire guard which actually attracted the lightning and suffered damage.

"Here, then, is a most acceptable situation where a plastic material can be used as an interesting novelty, for a chimney guard made of such a compound would have no lightning-attracting property, but at the

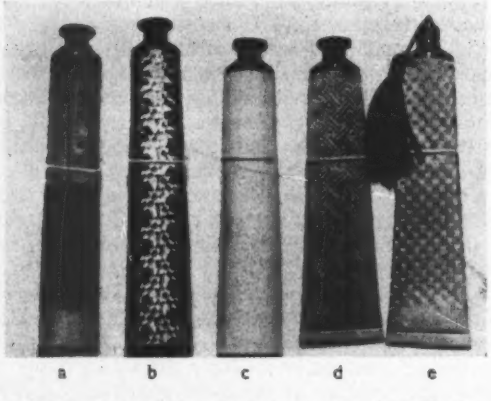
same time will prove quite weather-resisting and adaptable for fitting over the chimney opening. As an alternative to the usual metal wire of which chimney guards are made, there has been nothing available but wickerwork, which is non-attractive to lightning; wickerwork, however, soon suffers deterioration by the weather and if enamel-covered metal wire be suggested as an alternative the enamel covering would not make the underlying metal immune from attack in a thunderstorm.

"This suggestion for chimney guards made of plastic material in the form of grids, which could be fitted to the chimney opening, or otherwise manufactured in woven form, does not stop at an invention for use on chimneys of private houses. There is also an industrial application in the form of a spark arrester upon small chimneys serving furnaces, incinerators and small boiler plant in close proximity to inflammable material, such as stacks of wood, for here the danger of damage by lightning is also present and provides another risk in place of the one which the spark arrester is intended to eliminate. A spark arrester made of a modern plastic material would be perfectly safe against lightning in such a situation."

Collapsible Tubes

Novel methods of producing collapsible tubes are always interesting to most readers, so I have culled the following from the German journal *Kunstoffe*, which is devoted to plastic materials.

Efforts have been made during the past few years to develop a non-metallic collapsible tube; the first German patents in this field were taken out at the beginning of 1937. The synthetic resin tubes made by the Thüringer Kunststofftubenfabrik Harnickel and Müller are of two kinds—"metal-substitute" tubes, which superficially are deceptively like metal tubes, and the so-called "de luxe" tubes which form novelties in the field of cosmetic packaging.



Various designs of synthetic resin tubes. (a) Metal substitute tube; (b) tube with patterned paper wrapping; (c) tube with embossed fabric wrapping; (d and e) De luxe tubes with rayon wrapping.

The tubes each contain an internal transparent film, which forms the actual inner lining. This film is strengthened by a surrounding textile fabric, which is in turn covered by an external film of synthetic resin. In the simple designs the external film is printed to provide the finish (see Fig. *a*). In the more elaborate types additional external coverings are used for decorative purposes—of paper *(b)*, fabric *(c)*, or rayon *(d, e)*.

These synthetic-resin tubes are seamless and retain their shape permanently; they are more hygienic than metal tubes and almost untearable. The cardboard shell, which is inserted into metal tubes during filling in order that they may retain their shape, is unnecessary with synthetic-resin tubes.

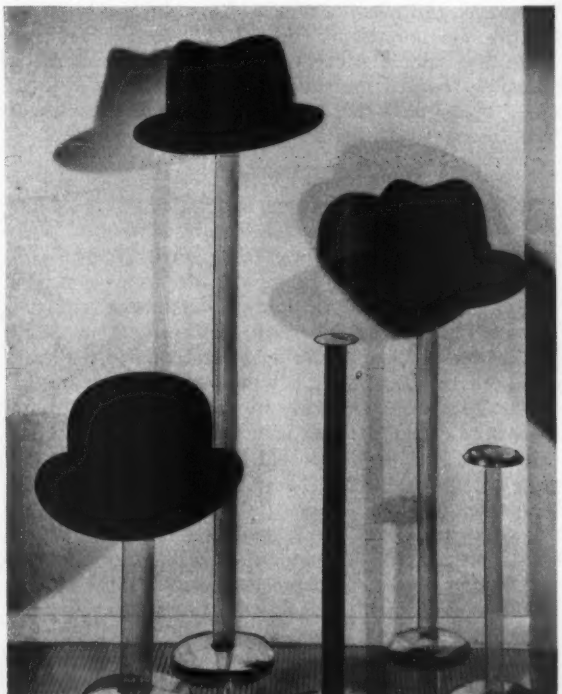
In view of the efforts made to economize in the use of metals, the development of synthetic resin tubes deserves the closest attention. It is not necessary to point out their enhanced beauty.

Hats Off To France!

It would seem that French hat shops for men are emulating those of the opposite sex in displaying their wares in a manner more conducive to twentieth century methods. It seems no longer necessary to have a window full of hats of every different size, shape, colour and material, so many, indeed, that no clear idea of what one wants is registered on the brain. Perhaps one day the men's hat-shop window will contain just one beautiful specimen in profile of an Eden black-felt chapeau, negligently, but very aristocratically, supported on a thin but equally aristocratic transparent support.

As I have already said, the French appear to be approaching these methods, using Tubo-Phane, a transparent cellulose acetate in tube form, for hat display. It is made in many tints and perhaps one day it will be available in fluorescent colours so that at night, under the action of ultra-violet rays, the boulevards of the City of Light will gleam and shimmer in a new way.

We reproduce the photograph below by courtesy of "Men's Wear."



PRODUCTION

Practical Information dealing with Raw Materials, Moulding and Forming of all types of Plastics—Thermo-Hardening and Thermo-Plastic—Works-Organization, New Plant and Control Apparatus

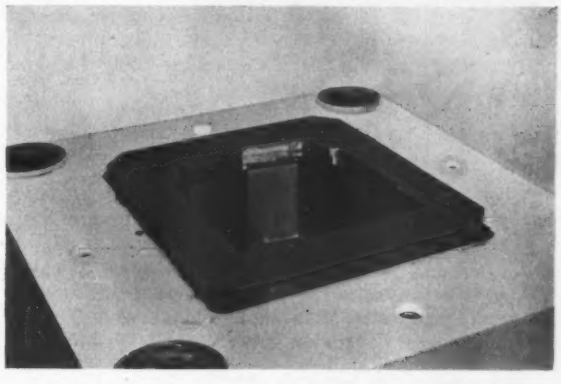
NOTES AND COMMENTS

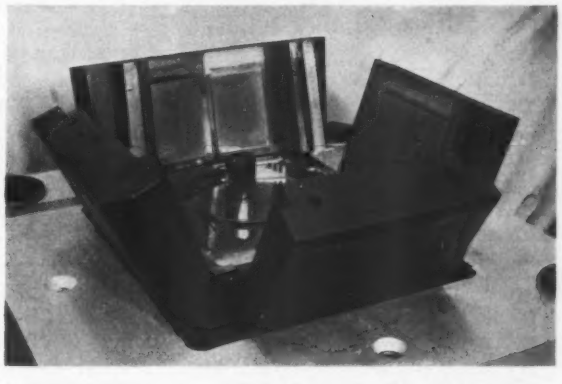
Phenol from Coal

ALTHOUGH there seems little likelihood of a shortage of phenol taking place, except in time of war, and even then it is presumed that the plants now existing for the production of synthetic phenol could be expanded, yet any news regarding its manufacture by means other than by the distillation of coal tar or from benzole by synthetic means is of importance for the plastics industry.

We note from the recent annual report of the Fuel Research Board that interesting work is now being carried out on the action of sulphuric acid on dry coal itself. Apparently this research was carried out originally to investigate the base-exchange properties of coals so treated in order to produce yet another series of materials suitable for the purification of industrial and other waters.

In the course of this work it seemed of interest to investigate the possibility of producing phenols from coal by fusing sulphonated coal with caustic alkali. The masses so obtained were subjected to hydrolysis and distillation, from which process a yield equivalent to 8 lb. of phenols per ton of coal was obtained. The type of phenols extracted is not given. Such a yield does not seem large at first sight, nor apparently economic, but it must not be forgotten that, should such a process be pursued, without doubt there would also be the possibility of the manufacture of a range of other and, perhaps, new chemicals of use to industry and the world at large.





The Case For Hinged Dies

From the manufacturing point of view there is, perhaps, only a slight advantage in the use of split or hinged dies, as the moulding can be removed from the open hinges without any effort and does not require pulling out. This, however, would never justify the considerable extra cost involved in the making of the tool, and the main advantages of having split dies lies in the possibility of providing undercuts, etc., either for technical purposes such as apertures and handles or for ornamental features such as recessed panels and intricate moulded shapes.

In these instances the advantage given by split dies is most important, as it will be readily understood that with an ordinary (plain draw) mould the sides must be plain and smooth to enable the moulding to be extracted.

E. K. Cole, Ltd., have developed the hinged die to considerable advantage, and their experience shows that for specialized work, such as intricate radio receivers, it can prove of great practical benefit.

Treforest Trading Estate

This now famous trading estate has just celebrated its second anniversary, and a very worthy record it presents. Erected with the co-operation of the Government in South Wales to combat the extraordinarily bad conditions of industry and to eliminate the sole dependence of South Wales on coal-mining, there are now 32 factories in production. What is so encouraging is that there are another 20 factories under construction. One factory makes plastic toys, others make paint, leather goods, tools and so on. One cannot praise too highly the work of the Distressed Areas Commissioners.

Inquiries and Answers

Nylon

Cardiff.

The Editor, *Plastics*.

Dear Sir,—I have read with very great interest the notes in the current and previous issues of *Plastics* upon the new material "nylon," which is being developed by the Du Pont organization. We are naturally concerned to see if it is at all possible to arrange for the establishment of a new factory in this area to manufacture this material. At first glance South Wales would seem to be an ideal place for the manufacture of the material to its first stage, and possibly also some, if not all, of the finished products.

I should be glad if you would inform me whether Du Pont have any working arrangement with an English firm whereby that firm would inevitably be the manufacturers of the new material in this country. If so, I should be glad if you would let me know the name of the firm.—Yours truly,

TERENCE YOUNG, Economic Adviser.
National Industrial Development Council of Wales and Monmouthshire.

[EDITOR'S NOTE.—We do not know if the Du Pont organization has made any arrangement with an English firm. Inquiries should be made direct to E.I. du Pont de Nemours and Co. Inc., New Jersey, U.S.A. Some immediate information might be obtainable from Imperial Chemical Industries, Millbank, London, S.W.1. There is considerable collaboration between the two concerns at least in technical matters.]

Nylon Bristles

Copenhagen.

The Editor, *Plastics*.

Dear Sir,—In the January issue of *Plastics* you mentioned Dr. Carothers's nylon bristle that to-day is being sold in America under the name of Exton. We should be grateful if you could inform us of the name of the firm which sells Exton, and whether Exton is also being sold in England. KRUGER AND NÆSTED.

[EDITOR'S NOTE.—The "Exton" bristle is used in Dr. West's Miracle-Tuft toothbrush, and is made by Du Ponts for the Weco Products Co., of Chicago. According to our information, neither toothbrushes nor nylon fibre is yet available for sale in this country. See also answer given above with regard to further information in Great Britain. No details are available from the U.S. Commercial Attaché.]

New Oilproof Containers

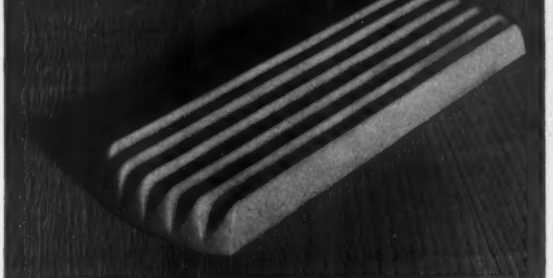
About a year ago we received a request for information regarding the proofing of paper containers for oil. Unfortunately we have lost trace of the inquirer, but should this meet his eye it may meet his requirements. A recent British patent, B.P.494,838, states that containers, formed of paper or like material, are rendered oilproof internally by coating with material consisting of water-insoluble resinous materials, such as the acrylic acid or vinyl plastics emulsified in water or other non-solvents. We believe that the inquirer was a member of an oil company in this country.

Brush Without Bristles

Koln-Braunsfeld.

The Editor, *Plastics*.

Dear Sir,—With reference to the article "Brush Without Bristles," which appeared in the January number of *Plastics*, we send you, by separate post, a sample of a brush plate prepared by the injection moulding process, which was prepared in Germany on our machines a long time ago under the name in question. As raw material Trolitul of amber colour with an addition of 10 per cent. real amber powder was used. We should be glad if you would draw attention to this in one of the next numbers, at the same time showing a picture of the brush plate.



It is to be added that for the preparation of an air-pressure machine, our type EL IX is used, on which parts up to a weight per part of 150 grammes can be prepared. ECKERT AND ZIEGLER.

[EDITOR'S NOTE.—We have pleasure in publishing the above photographs, which show the obverse and reverse of the brush plate. The article in question dealt with the formation of static electricity on the plate, so that dust is removed.]

TRADE AND PERSONAL NOTES

George Bray and Co., Ltd., Leeds, 2, the well-known manufacturers of industrial heating devices, have just published a 12-page leaflet describing their new products.

The Physical Society's Exhibition was held at the Imperial College of Science and Technology, South Kensington, from January 3 to January 5. This made the 29th annual exhibition and was very well patronized. Following usual practice, the exhibition was made up of two sections of exhibitors—the trade section and the various research organizations. A number of firms interested and actually engaged in the plastics industry were present, and among these were Ellison Insulations, Ltd., Birmingham.

The Plastic Industry in Palestine is now making good progress and we understand that Mr. Bruno Rabinowitz has taken a larger factory, moving from the town of Haifa into a new industrial zone which has been set up under Zionist auspices at Haifa Bay. A large variety of household wares and industrial accessories under the trade name of "Haklit" are manufactured. The moulding powder is imported from England. Goods are made for export as well as for local use, and among regular buyers are Syria, Iraq and Cyprus, which, like Palestine, are undergoing an economic transformation.

The Imperial Chemical Industries announce a new step in their policy of reorganization. A number of executive managers have been created who will ease pressure of detail work upon the management board. The directors have appointed Mr. A. Flack to be a delegate director of the Plastics Group Board.

N.B. Mouldings, Ltd., Tremlett Grove Works, Highgate, London, N.19, inform us that in our last issue we referred to them as N.B. Moulders, Ltd., instead of N.B. Mouldings, Ltd. We regret the error and have pleasure in rectifying it.

Buna Production, in Germany, is being greatly increased as the result of intensive manufacture at a new works at Schopkau, near Halle.

Dr. G. F. New, Imperial Chemical Industries, and immediate Past President of the Oil and Colour Chemists' Association, was presented by Mr. A. J. Gibson, the President, with copies of the bound volumes of the Proceedings of the Association in recognition of his services during two years of office.

Mr. A. J. Gibson, Special Officer for Lac Inquiry of the London Shellac Research Bureau, has been elected President of the Oil and Colour Chemists' Association.

Monsanto Chemical Co., U.S.A., announce a new addition to their plastic products. This is Vue-Pak, a transparent cellulose acetate sheeting. The special machinery developed for the new process is designed to produce transparent sheeting with a maximum gauge variance of one-half to one-thousandth of an inch, which represents a major improvement over the previous cut cellulose acetate sheets.

The Tennessee Eastman Corporation, Kingsport, Tennessee, U.S.A., have just announced a new thermoplastic moulding compound known as Tenite II. The new plastic, a cellulose acetate butyrate compound, is said to have particular resistance to distortion under varying degrees of heat and humidity. Articles made from one grade of the new material are reported as being able to withstand as much as five minutes' boiling in water without impairment of the surface finish. The material is available in a range of grades and colours for use in either compression or injection moulding. In the latter process, heated moulds may be used for better weld and flow, a departure from usual injection moulding technique.

Sir Frank Smith, G.B.E., is relinquishing his appointment as Secretary of the Department of Scientific and Industrial Research. He was lately Secretary of the Royal Society.

The British Thermostat Co., Ltd., exhibited at the recent annual exhibition of Scientific Instruments and Apparatus, organized by the Physical Society and held at the Imperial College of Science and Technology, London, January 3 to 5, 1939. Among the exhibits were two of outstanding scientific interest: the "Teddington" automatic temperature controller and the "Teddington" Humidistat.

Merryweather's, Greenwich, London, S.E.10, invite manufacturers in the plastic industry to write for their booklet 703Q, which is post free on request. The literature available describes, very fully, new methods of fire protection and air raid precautions for factories, warehouses, etc.

Treforest Trading Estate, South Wales, reached on December 31 its second anniversary, when 38 factories had been completed (32 in production) and another 20 were in course of erection.

Alderman Edwin Thompson, J.P., Governing Director of Manesty Machines, Ltd., and Thompson and Capper Wholesale, Ltd., Speke Hall Road, Liverpool, 19, is sailing for South Africa on a business visit in the "Warwick Castle," leaving Southampton on February 9. Mr. Thompson will stay in Capetown, Johannesburg and Durban during his visit.

Mr. Edwin Thompson was Lord Mayor of Liverpool in 1930-1931.

British Artificial Resin Co., Ltd., has been formed with a registered capital of £100 to carry on the business of manufacturers and dealers in chemicals, resins, both natural and synthetic, and all kinds of plastic or mouldable substances. The address is 10, Norfolk Street, W.C.2.

British Tego Gluefilm, Ltd., with a registered capital of £30,000, is to acquire, upon the terms of an agreement dated June 27, 1938, and made between the Micanite and Insulators Co., Ltd., and Thomas Goldschmidt A.G., British patents Nos. 347,242, 333,194 and 401,674, of February 2, 1929, February 27, 1929, and April 2, 1932, respectively. The Micanite and Insulators Co., Ltd., may, so long as they hold 15,000 shares, appoint four directors, and Thomas Goldschmidt A.G. may, so long as they hold 5,000 shares, appoint one director.

Tomloy Chemical and Engineering Co., Ltd., is a new company, capital £2,000, office 5-6, Princes Street, Cavendish Square, W.1, formed to manufacture and deal in plastics.

British Natural Resins, Ltd., is a new company with a capital of £100, registered office Spencer House, South Place, E.C.2, formed to carry on the business of manufacturers, importers and exporters of, and dealers in, treated and untreated shellacs, resins, gums and chemicals, etc.

PATENTS RELATING TO PLASTICS

These abridgments of recently published specifications are specially compiled for this journal by permission of the Controller of His Majesty's Stationery Office. Group abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, either sheet by sheet, as issued, on payment of 5s. per group volume, or in bound volumes, price 2s. each, and the full specifications can be obtained from the same address, price 1s. each.

487,041. Cellulose Xanthates

LINDAHL, P. E. January 18, 1938

Wood is rendered more resistant to water, flames, and organisms by impregnation with alkali hydrate followed by drying and further impregnation with carbon bisulphide. For surface treatment, the planed, etc., surface is soaked with a 15 per cent. solution of alkali hydrate, left to dry and then treated with carbon bisulphide by dipping or by wrapping with absorbent material impregnated with carbon bisulphide. After evaporation of any residual carbon bisulphide the surface may be polished by sand papering. Complete impregnation is effected by placing the wood in a sealed container under vacuum, introducing alkali hydrate solution until the wood is completely immersed and allowing impregnation to continue under atmospheric pressure; after complete penetration, residual solution is removed and any water evaporated, if desired, under reduced pressure and heat, following which carbon bisulphide is introduced advantageously mixed with another liquid, e.g., ethyl alcohol, which does not dissolve cellulose xanthate; the wood is finally dried in vacuo. Carbon bisulphide may be applied in vapour form. The wood may be compressed during impregnation with carbon bisulphide and may be finally dried under pressure. Wooden articles, e.g., floor boards, weather boarding, window frames, wooden furniture, and gramophone needles may be treated.

487,115. Casein; Artificial Threads

NAAMLOOZE VENNOOTSCHAP ONDERZOEKINGINSTITUUT RESEARCH. August 30, 1937.

Casein in a form which, when dissolved in an alkali solution, is suitable for the production of artificial threads, is made by precipitation from skimmed milk below 50 degrees C. by addition of acid, and then heating the moist casein for from one hour to five hours, preferably at 50 degrees C. to 100 degrees C. The heating may be effected by steam in a closed container, or while the casein is suspended in water; in the latter case the water being neutral, weakly acid or weakly alkaline, but is preferably at *p*H 4.6. In an example, casein is precipitated by adding hydrochloric acid to milk skimmed at 36.5 degrees C., the acid being added at 34.5 degrees C. to produce *p*H 4.6. The casein is filtered, washed, suspended in water at *p*H 4.6 and heated for two hours at 85 degrees C. It is dissolved in ammonia to a solution containing 17 per cent. of casein and may be spun in a bath containing 20 per cent. zinc sulphate, 1 per cent. sulphuric acid, and 5 per cent. of a neutralized condensation product of half a molecule of formaldehyde and one molecule of cresol sulphonic acid.

485,941. Vulcanizing Synthetic Rubber

HABGOOD, B. J., HILL, R., MORGAN, L. B., and IMPERIAL CHEMICAL INDUSTRIES, LTD. August 25, 1936.

Synthetic rubber-like materials, adapted to yield vulcanizates having a high resistance to abrasion are obtained by polymerizing in aqueous emulsion butadiene, together with an amount of methyl methacrylate not less than 10 and not more than 100 per cent. of the weight of butadiene. Polymerization may be effected by passing the requisite quantity of butadiene into a mixture of water or ice, methyl methacrylate and other ingredients. Small proportions of electrolytes, e.g., acetic acid alone or admixed with sodium acetate, and catalysts, e.g., hydrogen peroxide, may be added. Latex-like products are obtained which are coagulated by adding ethyl alcohol, etc., and the coagulum is washed and dried on heated rollers. In examples 1, 3 and 4, butadiene, methyl methacrylate, cetyltrimethyl - ammonium bromide and acetic acid are mixed together and agitated in a closed vessel at 60 degrees C., and the product is coagulated with ethyl alcohol. In example 6, cetyl-*p*-dimethyl aminobenzoate, methosulphate is employed in place of cetyltrimethylammonium bromide and coagulation is effected with sodium hydroxide.

492,600. Zein

POLLAK, J. E. (International Patents Development Co.). March 18, 1937.

Zein is extracted from maize proteins with an aqueous alcoholic solvent to which is added an alcohol-miscible organic solvent for maize oil and colouring matter, which is a non-solvent for zein, the resulting extract being treated with further auxiliary solvent and the zein solution separated from the solvent layer containing oil and colour. Lower aliphatic alcohols such as ethyl or methyl alcohol containing up to 20 per cent. or more, preferably 7-8 per cent., of water may be used for the extraction, the auxiliary solvent being, e.g., toluol, benzol, xylol, chlorinated hydrocarbons, or aliphatic hydrocarbons. One part of toluol to two of alcohol may be used without separation of the mixture into two phases. The extraction is preferably effected below 70 degrees C. with a final *p*H above 6 as in Specification 492,599. The extract, preferably without concentration, is treated with further auxiliary solvent sufficient to cause separation into an alcoholic zein solution and an oil and colour solution layer which is removed. The zein solution may be further concentrated and purified by repeating the treatment. In an example, ground gluten meal is mixed with ethyl alcohol, toluol, and caustic soda solution at 60 degrees C. The extract, which has a *p*H of 6.5, is decanted and extracted thrice with toluol. Zein is recovered from the concentrated alcoholic solution which separates.

492,655. Artificial Filaments

POLLAK, J. E. (International Patents Development Co.). March 18, 1937.

A solution of zein, which may contain plasticizers, is extruded through a filament-forming orifice into a coagulating medium, during which operation the zein is in contact with a reactive aldehyde, and the filament thus formed is heated to evaporate the solvent and promote reaction between the aldehyde and the zein. The solution may be extruded into air or into water or other liquid coagulating medium. The reactive aldehyde, e.g., formaldehyde may be present in the solution of the zein, or may be added to the coagulating medium. After withdrawal from the coagulating medium, the filament is subjected to an air current heated to a temperature not above 100 degrees C., and is then skeined and baked at 60 degrees C. to 90 degrees for eight hours to 10 hours.

492,734. Polyacrylic Acid Derivatives

ROHM AND HAAS AKT. GES. December 18, 1936.

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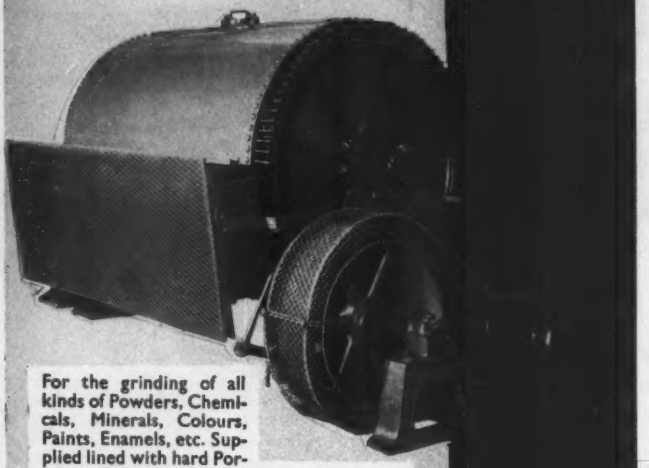

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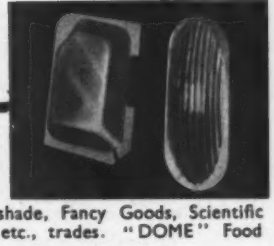

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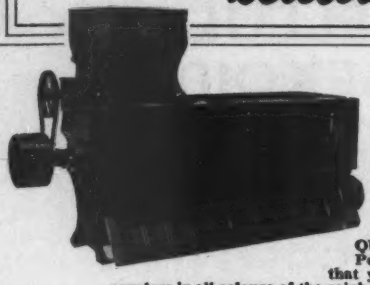

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